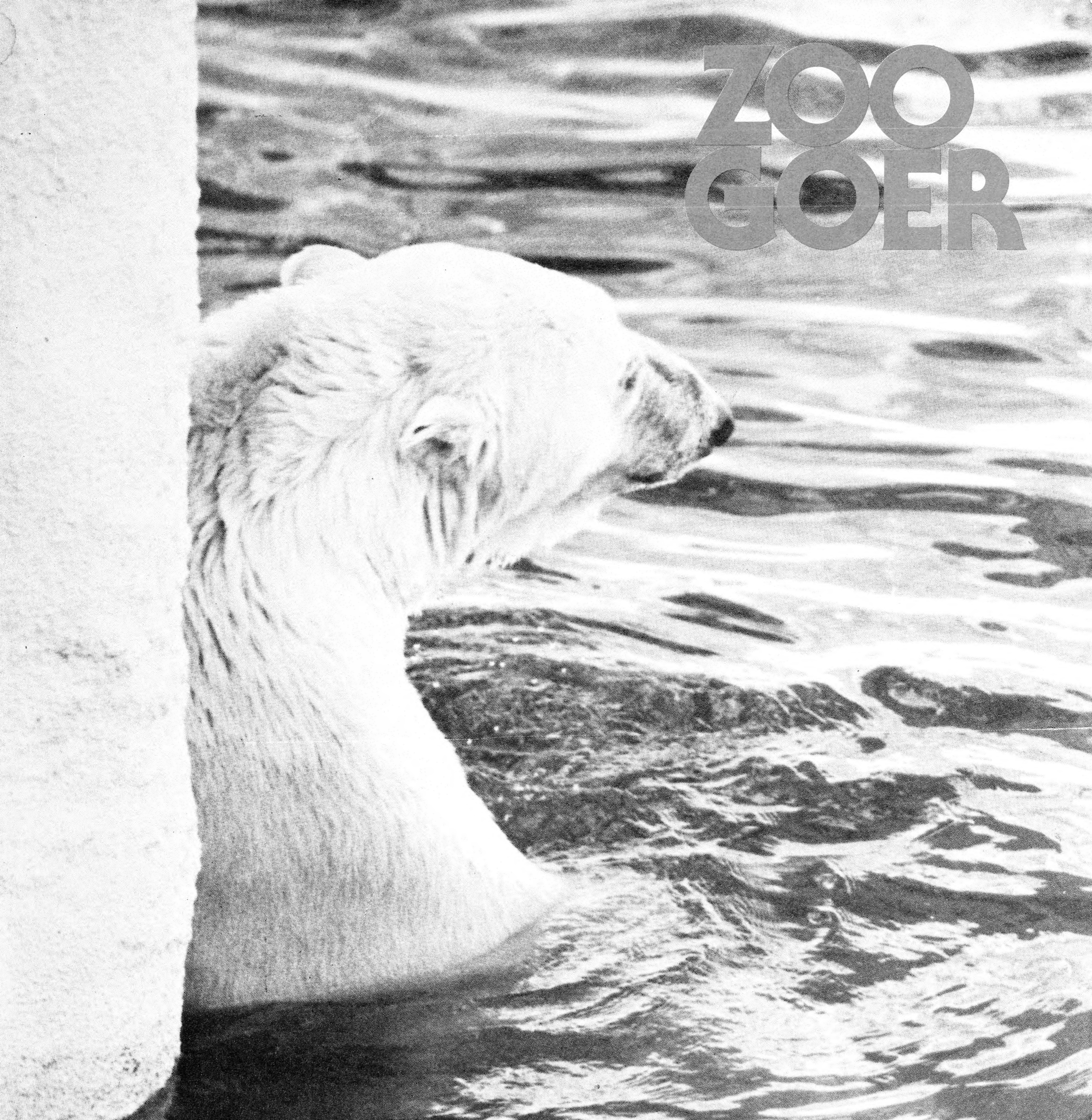
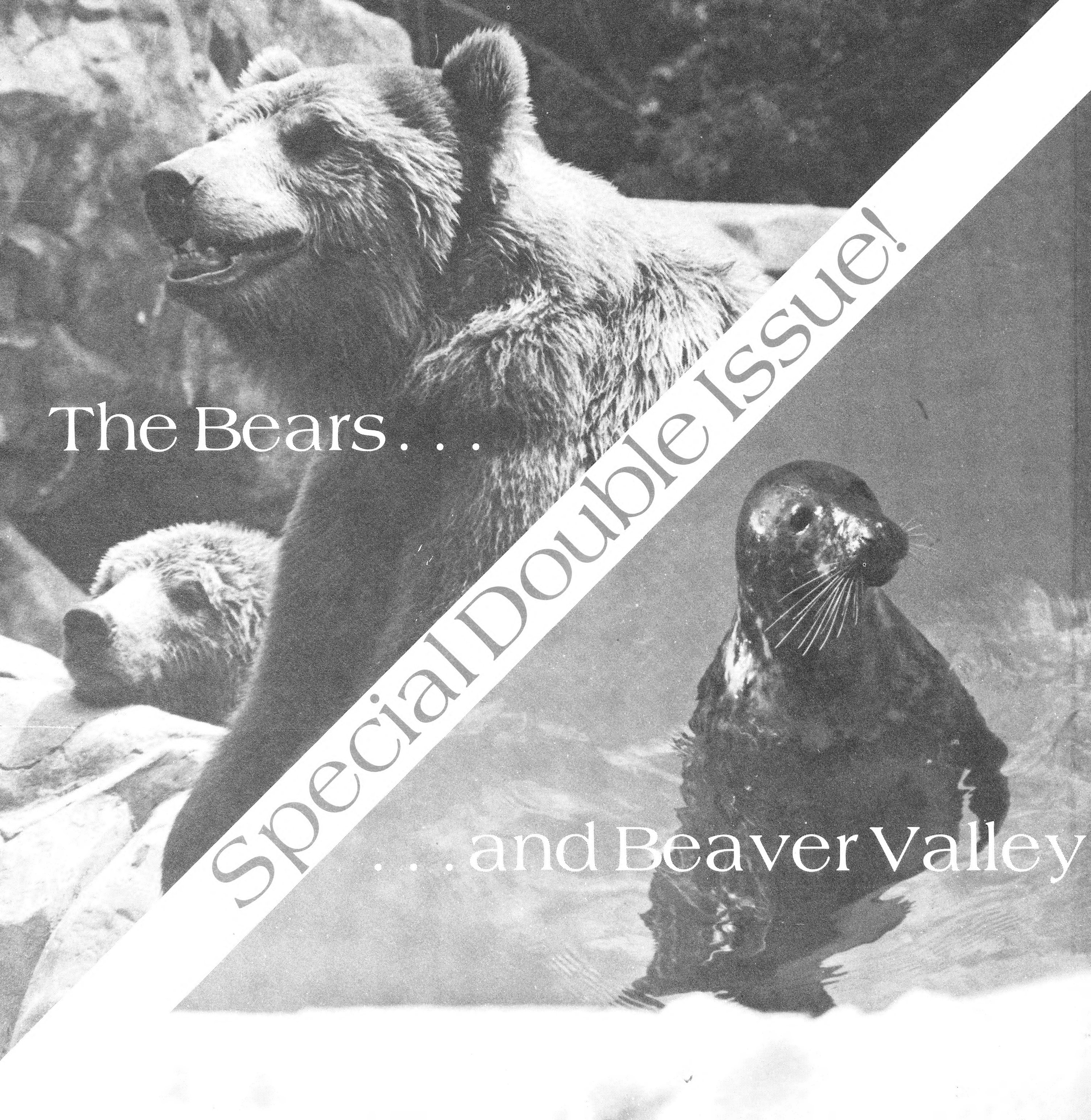


ZOO GOER

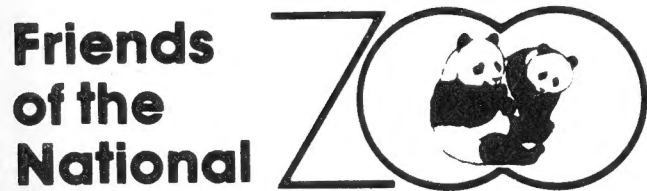




The Bears . . .

Special Double Issue!

. . . and Beaver Valley



is a non-profit organization of individuals and families who are interested in supporting Zoo programs in education, research, and conservation.

As members of FONZ, you and your family receive many benefits—publications, discount privileges, and invitations to special programs and activities—to make your zoo-going more enjoyable and educational.

ZooGoer is published bi-monthly by the Friends of the National Zoo, c/o The National Zoological Park, Washington, D.C. 20008. Third class mailing permit 44282. Subscription as percentage of full membership dues is \$4 a year. Subscription-only membership is \$5 a year (extra cost covers processing, handling, and related expenses) and is available only to institutions or those residing outside of the Washington, D.C., metropolitan area.

© 1979, Friends of the National Zoo. All rights reserved.

ISSN: 0163-416X

FONZ Board of Directors, 1978-1979

Stephen T. Hosmer, *President*; John S. Brown, *First Vice President*; Wayne S. Quin, *Second Vice President*; M. Anthony Gould, *Treasurer*; Victor Delano, *Secretary*; Samuel Biddle; Edward G. Boehm; Janice A. Booker; Montgomery S. Bradley; William C. Bryant; Al Hackl; Julie P. Hubbard; A. José Jones; Nella Manes; Stanley R. Mayes; Cecil McLelland; Sheila D. Minor; Monica J. Morgan; Robert L. Nelson; John B. Oliver; Joseph Y. Ruth; Ross Simons; Julia Vadala Taft; Sally S. Tongren.

FONZ Staff

Sabin Robbins, *Executive Director*; Dennis Baker, *Associate Director*; Donna Schlegel, *Volunteer & Educational Services*; Mary W. Matthews, *Publications*; Fran Bernstein, *Membership*; Tom Frame, *Food Services*; Lonnie Wornom, *Merchandising*; Kevin Polen, *Transportation*.

Zoo Staff

Dr. Theodore H. Reed, *Director*

Office Chiefs

Mr. Jaren Horsley, *Animal Management*; Dr. Christen Wemmer, *Conservation Research Center*; Dr. Mitchell Bush, *Animal Health*; Dr. Richard Montali, *Pathology*; Dr. John Eisenberg, *Zoological Research*; Mr. Emanuel Petrella, *Facilities Management*; Mr. Robert Mulcahy, *Graphics & Exhibits*; Ms. Judy White, *Education & Information*; Mr. Samuel Middleton, *Police & Safety*.

Editor:
Mary W. Matthews

Consulting Editor:
Mary C. Massey

ZOO GOER

Volume 8, Nos. 1&2
January-April, 1979

4 What is a Bear?
by Jaren Horsley

7 The Bear Facts
by Miles Roberts

16 Remember,
Only You—
by J. Fisher

18 Taking Care
of Bears
by Jaren Horsley

23 The Ascent of Bears
by Jaren Horsley

27 Busy as a
Beaver Valley
by Daryl Boness

32 Backstage with the
Seals and Sea Lions
by Emily Rudin

39 Beaver Valley
Who's Who
by Mary W. Matthews

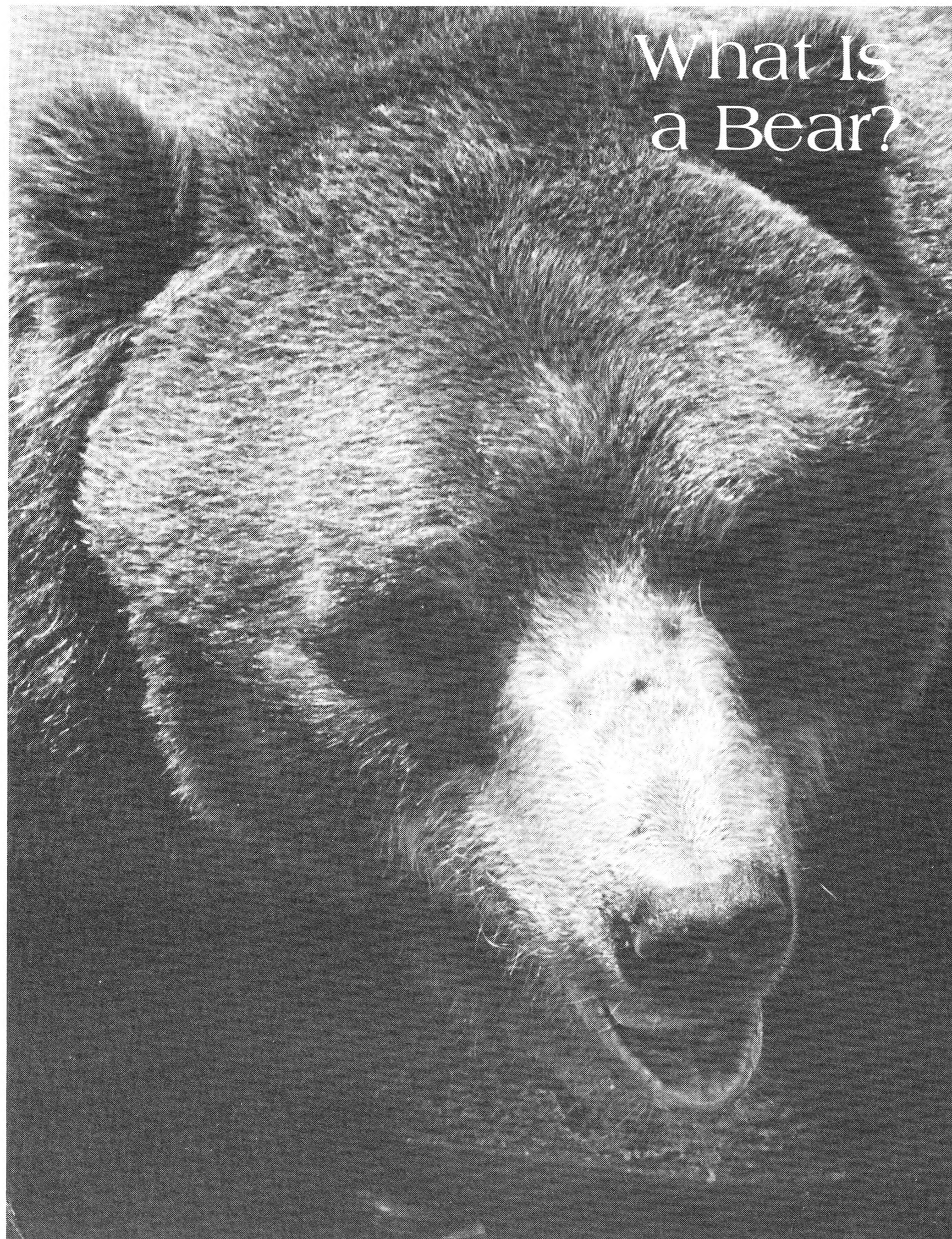
46 BOOKNEWS

Illustrations Credits: Front cover, p. 29 by Nancy Slaughter; pp. 2a, 4, 8c & 12, 8d & 13, 8f & 15, 18, 20, 23, 26a, and 28 by Francie Schroeder; pp. 2b, 5, 19, 25, 26b, 30, 33, 34, 35, 36, 37, 39, 40, 42b, and 43 by Mary W. Matthews; p. 6 by Richard Clayton; p. 7 by Ben Butterfield; pp. 8a & 9, 27, 38, 41, and 47 by Sabin Robbins; pp. 8b & 10 and 21 by Jeanne White; pp. 8e & 14 and 24 courtesy of the Office of Education, NZP; pp. 16 and 17 courtesy of the U.S. Forest Service; p. 22 by A.G. Schoenfeld; p. 31 by Cathy Kanak; pp. 44, 45, and back cover by Ilene Berg, NZP Public Affairs Office; p. 42a by Dorothy Finch, from *Book of Fabulous Beasts* by A.M. Smythe (London: Oxford Univ. Press, 1939).

FRONT COVER: The polar bear is the most aquatic of all bears and can swim for miles. This photo by Nancy Slaughter won first prize for black-and-white in FONZ's annual photo contest.

PAGE TWO (top): These two brown bears are as interested in Zoo visitors as visitors are in them. Bears should not be mistaken for gentle friends, though; they are dangerous wild animals.

PAGE TWO (bottom): Intelligent, graceful, and friendly, the grey seal is only one of many stars at the Zoo's newest exhibit—Beaver Valley.



What Is a Bear?

The Kodiak bear, a species of brown bear, is the biggest of all bears, attaining weights up to 1,700 pounds.

Jaren Horsley

What is a bear? When you think of bears, what comes to mind—the Russian bear, the three bears, Yogi Bear, Smokey Bear, Winnie the Pooh?

Probably almost everyone has seen a bear, either in a national park or at a zoo or circus. But does any of this tell you what a bear really is?

In fact, the bear is a mystery. For such a large and commonplace animal, a great deal remains to be known about the bear. Although they are a dominant part of our North American wildlife, what we know about bears is still partly myth.

One thing a bear is, is history. For example, the grizzly bear, part of the wide-ranging brown bear species, was infamous in the history of the American frontier. The journals of Lewis and Clark from 1804 to 1806 document dramatic encounters with the grizzly; and to this day the grizzly is legendary for its power and ferocity. Though some of the horror stories about it are exaggerated, the grizzly remains an animal not to be taken lightly.

A bear is also beauty. That same fierce grizzly adorns the northern sky as Ursa Major, the great bear, and contains 53 visible stars. Close by, Ursa Minor, the little bear, contains Polaris, the North Star.

A bear is religion. Before people encountered the lion, the bear was considered king of beasts. Humans have always viewed bears with an ambi-

JAREN HORSLEY came to the Zoo in 1969 as curator of reptiles. He became general curator in 1972, and since January 1978 has also acted as curator of large carnivores—which includes bears.

valent love-hate akin to the religious impulse. The bear clan or cult has been common in primitive cultures since the early Stone Age. In native American tribes, the bear symbolizes power and skill; to emulate this animal is to capture some of its apparent invincibility. In our larger society, bear cults have been replaced by the Chicago Bears, the UCLA Bruins, and the Chicago Cubs—sports teams which, through emulation, hope to capture the bear's power and invincibility.

A bear is fantasy. The teddy bear, an all-time favorite toy, is like no bear that ever lived. The teddy appears to be an attempt to cross the rag doll, the koala, and the bear cub. Certainly a bear cub is a cuddly creature, and makes the fantasy come more easily. Winnie the Pooh and Paddington, literary bears inspired by the teddy bear, are two other anthropomorphized bears—bears that are not fearsome, but lovable.

A bear is symbolism: the Russian bear, sure of its power, slow to anger, capable of swift and strong retaliation if provoked. Smokey Bear is a symbol—an easy-going father figure, reminding us to be careful in the forest.

A bear is a misunderstood animal. Bears are large and strong, but not necessarily surly or vicious. The polar bear and grizzly bear both have reputations for ferocity that are not totally undeserved, but nevertheless exaggerated. Most bears are in fact rather easy-going when encountered in the wild, unless they have been surprised; then they may act first and run away afterwards. This must not be misconstrued, however, to mean that a



The European brown bear (*Ursus arctos arctos*) is smaller than most brown bears;

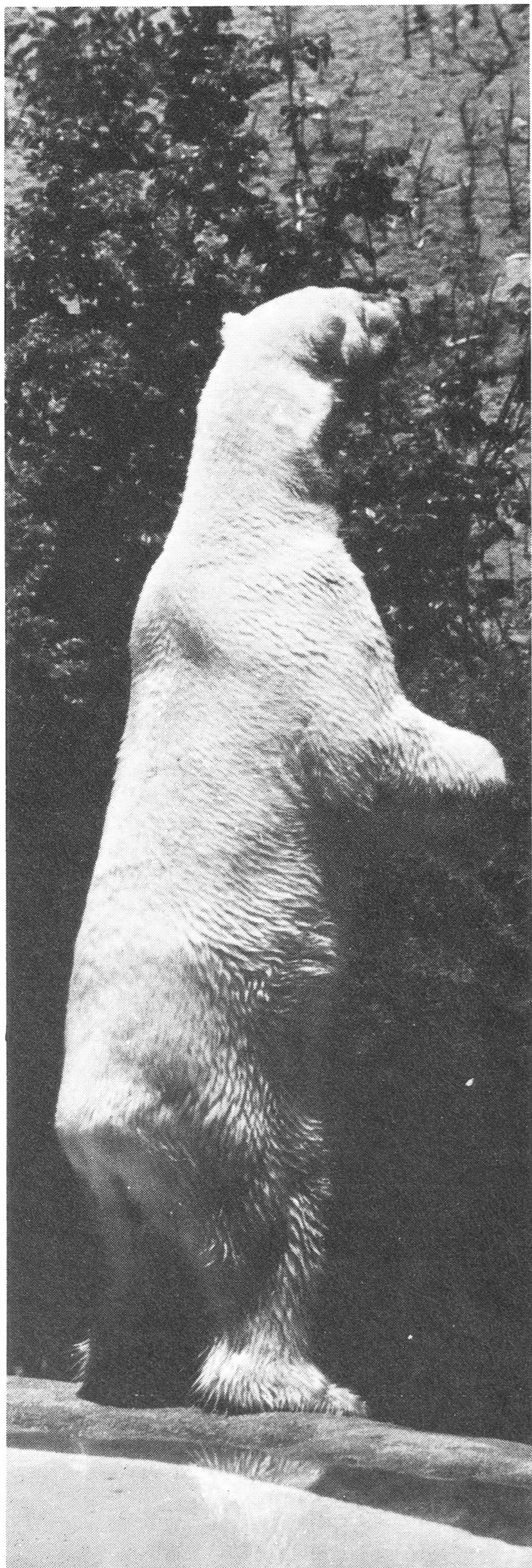
the average adult male weighs 450-500 pounds.

bear is friendly. The rangers at most national parks have lost a great deal of sleep trying to figure out how to get visitors to respect the bear as potentially very dangerous. When aroused, a bear can inflict fatal injuries—and bears certainly don't live in parks for the purpose of posing for photographers.

A bear is diversity: there are seven species of bears. Brown bears, which include grizzlies, are the most far-reaching of the species, found in North America, Europe, and Asia. The black bear is the most familiar species; it is found only in North America. Two lesser-known bears are the sloth bear of India and the spectacled bear of

northern South America. These two species are very rare, and may not survive this century. The Asiatic black bear and the sun bear are neighbors of the sloth bear. Rounding out the seven is the polar bear of the Arctic.

Bears are a family. *Ursidae* ("the bears" in Latin) is the family name of bears in mammalian taxonomy. Bears are closely related to dogs, and have been lumped in with the canines by taxonomists who prefer to see fewer names in the higher taxonomic categories. There is something to be said for this view; bears are like dogs in



many ways—though I think they would fall short as “man’s best friend” (and would certainly be unpopular in New York City!).

While we are talking about taxonomy, it is important to point out that the bear is a carnivore. So are skunks, lions, mongooses, dogs, hyenas, and weasels. Even though most bears are omnivorous, their history and tooth structure mark them as meat-eaters—no matter how many of them live on berries.

A bear is controversy. Depending on who you talk to, the panda either is a bear—or isn’t. Some experts believe, on the basis of blood serum analysis, that the panda is an “aberrant” bear. Most authorities, however, put the panda into a taxonomic family, *Ailuropodidae*, of only two species: the giant panda of China and the lesser panda of the Himalayan foothills and western China.

It’s at this point that you might wonder what’s in a name. If bears can be considered dogs, and pandas considered bears, then maybe some of the higher taxonomic categories—families, orders, genera, etc.—are less relevant than we think. The bear may be a controversy to the evolutionist, but for the rest of us, a bear is a bear is a bear. (Now, about the koala “bear” . . .)

A bear is a loner. Imagine the polar bear, roaming miles of frozen pack ice of the Arctic in search of ringed seals. This is the uneventful life of the male polar bear, who is social only to the

extent required for breeding with the female in mid-summer. The female also goes her way alone except when she has her cubs, which stay with her for their first two years of life.

Unfortunately, we use the human desire for long-lasting monogamy to judge other mammals by. The bear is one mammal that is not very sociable; having a “mate” is not the bear’s style. Bears can be seen in aggregations around garbage dumps and salmon runs—but this is more like a convention of hermits than any kind of socialization.

A bear is size. The giant Alaska brown bear, or Kodiak bear, can weigh as much as 1,700 pounds and stand as tall as nine feet on its rear legs. The polar bear is almost as big. This makes the bear the largest land-dwelling carnivore—and in the case of the highly carnivorous polar bear, this makes for a rather formidable creature. Most bears, luckily, weigh only 200 to 300 pounds; and the little sun bear weighs only about 150 pounds.

The bear is above all a paradox. It is an animal we both admire and fear. The bear is short-tempered, strong, unpredictable, and annoyingly persistent. It has immense power, speed, and agility; yet at the same time, we perceive the bear as gentle, friendly, cute—a source of fantasy, the well-spring of a thousand imaginary tales. The bear is unfriendly, fierce, powerful; yet the teddy bear is a favorite of children everywhere.

It’s hard to know what a bear is exactly! □

Just as sloth and sun bears adapt well to colder climates, this polar bear has adjusted well to warm weather.

The Bear Facts

Miles Roberts

How many living species of bears there are depends largely on which bear specialist one is talking to. As in any profession, there are differences of opinion. Such is the case for questions like, "Is the giant panda a bear?", "Are the grizzly and the Kodiak bear different species?", and "Which is the spectacled bear's closest relative?"

Although these questions are very definitely unsettled, the following list of species is the most current and widely accepted. It should be noted that the taxonomic Latin for each species includes the genus (generic name) and species (specific name). Together, these two names identify the animal and generally say something about the relationship of one species to another. Two animals with the same generic name are more closely related than two with different generic names; if two animals have the same generic and specific names, they are said to be of the same species. An animal's common (English) name is purely descriptive, and often misleading; but scientists usually refer to the Latin only when positive identifications are being made.

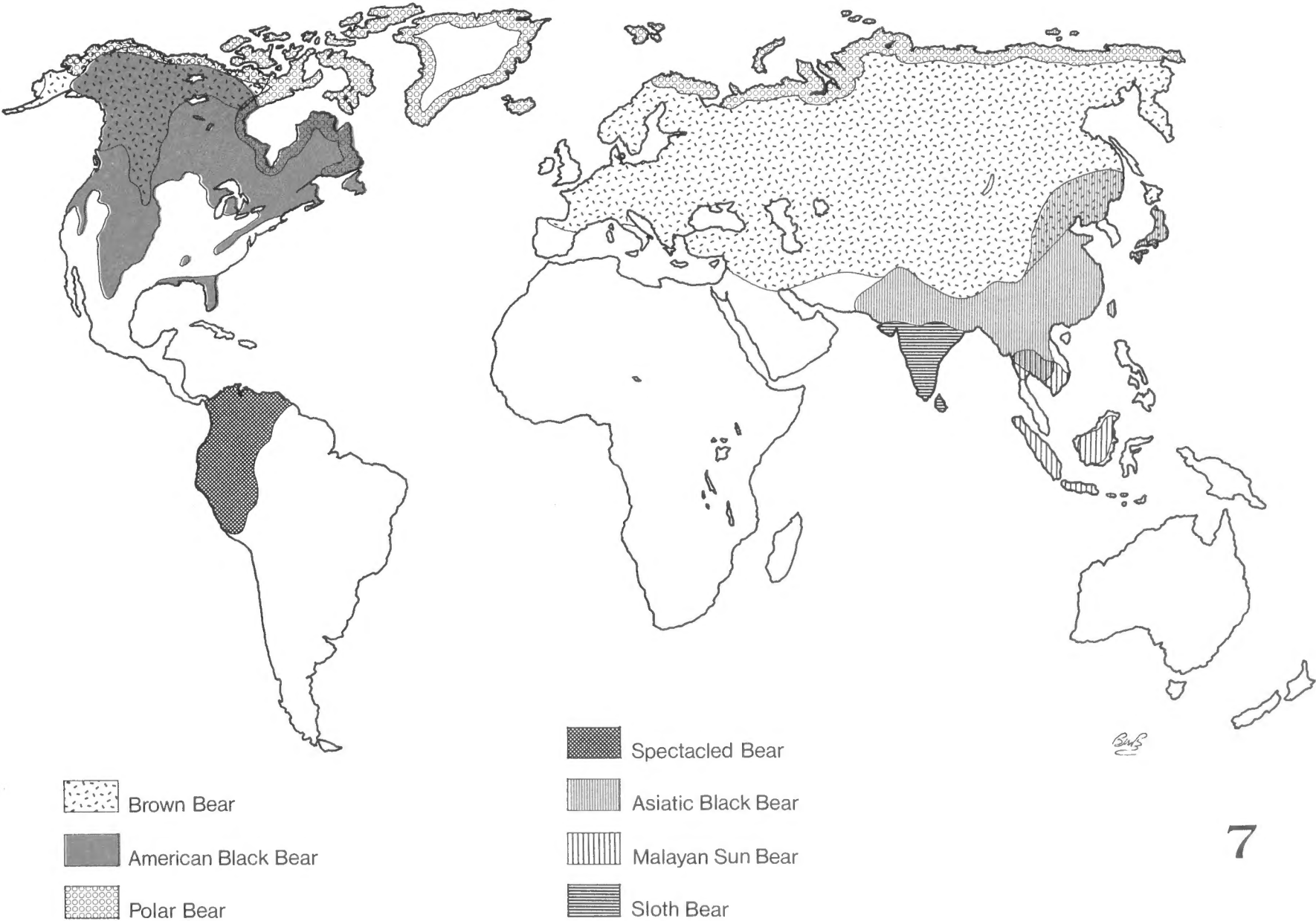
MILES ROBERTS has been with the Zoo for nine years, during four of which, 1973-1977, he was curator of bears. He has in addition done extensive research on sloth bears.

Common Name	Scientific Name
Polar bear	<i>Ursus maritimus</i>
Brown bear	<i>Ursus arctos</i>
American black bear	<i>Ursus americanus</i>
Sloth bear	<i>Melursus ursinus</i>
Sun bear	<i>Helarctos malayanus</i>
Spectacled bear	<i>Tremarctos ornatus</i>
Asiatic black bear	<i>Ursus thibetanus</i>

Bears are found primarily in the northern hemisphere. There are no bears at all in Australia and Africa; and only one species, the spectacled bear, is found in South America, thus making it the only southern-hemisphere

bear species. All bears are instantly recognizable as bears. They are big-bodied, short-limbed, and tailless. Fur covers their entire bodies. The ears are small, as are the eyes. The muzzle is long. All bears have a shuffling, flat-footed gait and powerful, non-retractable claws. In general, bears are omnivorous—that is, they eat fish, vegetation, and meat. Some species are more carnivorous, and some more herbivorous. Bears are mostly terrestrial, though there are some very good climbers and

In ancient times, bears roamed the entire world. Now, except for the spectacled bears, they are confined to the Northern Hemisphere.



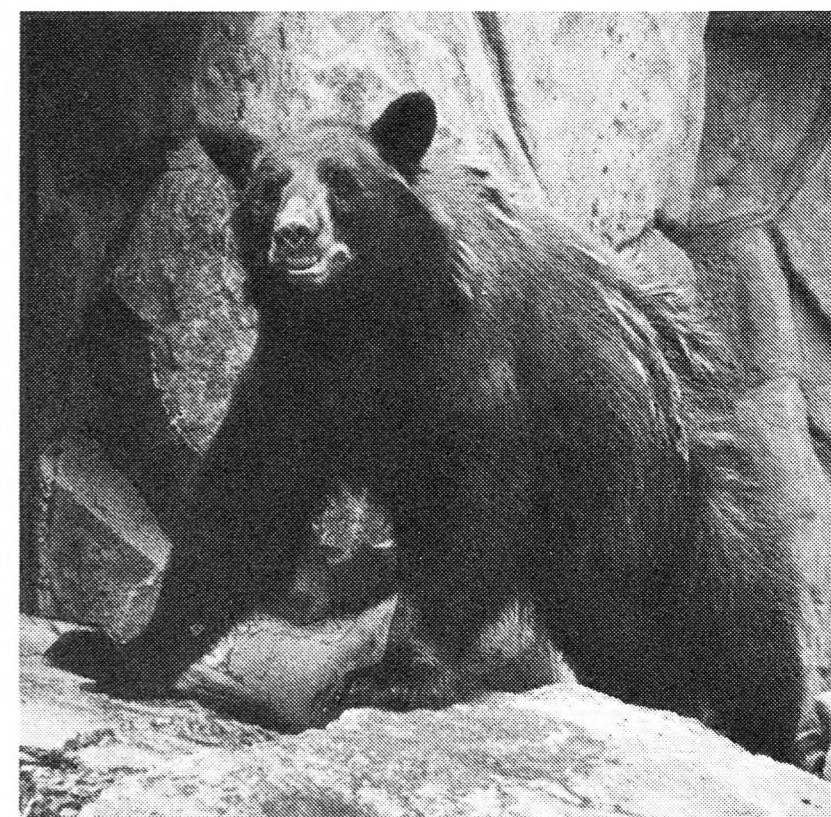
swimmers. Bears occupy a variety of habitats, from the barren Arctic tundra to the tropical forest. In short, bears are both well adapted and very adaptable.

Bears usually have two to four young. These are born in a secluded location and in very undeveloped condition. The cubs are generally hairless and weigh less than a pound. The young grow slowly, taking two years to become physically mature. They reproduce for the first time between three and four years of age. Females give birth every other year. In temperate climates, young are born during the winter when the mother is dormant.

Only bears in arctic and temperate climates become dormant. Dormancy is not strictly "hibernation" (because the bear's body temperature does not drop appreciably, and the animal can be easily awakened); but it probably serves the same general purpose—to reduce activity while food is scarce.

During pregnancy, most female bears undergo a process known as "delayed implantation." The fertilized ovum is stored in the oviduct or uterus in a state of suspended animation for up to half the total gestation period. At the right time, the ovum "implants" and resumes its development; birth occurs three to four months later.

This very complicated physiological process enables bears to come together to breed in spring and summer, when food is abundant and chances for hostility are low, and yet to delay birth until the mother is dormant and can give maximum energy to nursing her young. The final payoff in this system



Clockwise, from top left: the polar bear, brown bear, American black bear, sloth bear, sun bear, and spectacled bear.

is that by the time the slowly developing young are big enough to emerge from the den, it is spring again and more food is available. Delayed implantation is a beautifully organized, complicated, and delicate interaction between animal and environment that few people appreciate.

The following article discusses in detail the six bear species on display at the National Zoo—the polar bear, brown bear, American black bear, sloth bear, sun bear, and spectacled bear. Only the Asiatic black bear, a rare species, is missing from our collection. Much like the American black bear in temperament and physical characteristics, the Asiatic black bear is confined to the highlands of Asia, particularly Tibet, and along with the American black bear, it in all probability evolved from the brown bear.

(Ed. note: See Jaren Horsley's article, "The Ascent of Bears," on page 23 for a further discussion of the bears' evolution.)

Polar bear

Ursus maritimus

Circumpolar, Northern Hemisphere

The frozen desert wasteland of the Arctic is the polar bear's home. Never far from the open sea and the seals upon which it feeds, the polar bear is both the most carnivorous and the most aquatic of all bears.

With a creamy white camouflaging coat, a dense woolly undercoat, furred footpads, a streamlined body, and lightning speed both on land and in the sea, the polar bear is perfectly adapted to the cruel, inhospitable Arctic. Its swimming ability is almost legendary; the polar bear is often found



Close cousin to the brown bear, the polar bear is considered by some keepers the

most dangerous animal in captivity.

hundreds of miles from land, swimming tirelessly at up to three miles an hour.

In the water, the polar bear's weight—which may reach 1,200 pounds—is supported by a thick layer of fat and a coat that traps the air. On land, the animal will wander hundreds of square miles in search of its elusive prey, the ringed seal.

Occasionally polar bears have been seen on ice floes that have broken

away from the pack ice. It is believed that at certain times of the year they take advantage of the breakup of the pack ice to catch a "free ride" to sea, where better feeding may be found. So large and stable are some of these ice floes that females have borne and reared their cubs on them.

In spring and summer, polar bears

follow the ice north as it recedes. It is then that they may be found in areas not covered with snow or ice. Because in spring the females with cubs are emerging from their dens, and because prey is scarce, it is at this time of year that polar bears forage on whatever can be found—berries, grasses, sedges, and beached walrus, whale, and seal carcasses. As the ice pack expands in fall and winter, the bears move south and inland, where they den over for the winter, often spending several months in dormancy.

The polar bear's winter dens are remarkable structures. Usually found in a snow bank, the den begins with a plugged entrance. This is followed by a long tunnel that angles down at about 40°. The tunnel ends in a den chamber that the bear gouges out of the earth in an underlying embankment. Because snow and ice insulate well and therefore trap body heat, the interior of an occupied den may reach 60°F.—perfectly suited for the bear's winter needs.

Polar bears' principal food throughout the Arctic appears to be the ringed seal. However, there are exceptions. The polar bears that inhabited one group of islands in Hudson Bay subsisted primarily on sea birds for an entire summer. This observation, plus the bears' willingness to forage on whatever is at hand, indicates that despite its decided preference for meat, the polar bear can become omnivorous when circumstances require.

In years past, the polar bear was a major food source for Arctic natives. However, human technology, hunting, and territorial encroachment have had



The grizzly, a legendary figure in the history of the American west, is known

to taxonomy as *Ursus arctos horribilis*.

a major impact on the bear's populations. The species was awarded Endangered status in the early 1970s because its numbers had been decimated by hunters as well as by whalers and sealers. In 1973 a worldwide ban was placed on the hunting of polar bears on the high seas, although the species may still be taken under tightly controlled circumstances to regulate local population levels.

Brown Bear

Ursus arctos

Asia, Europe, North America

The brown bear is the largest of the bears and the most widely distributed bear species. In North America, the genus is represented by such forms as the Kodiak, Alaska, Kamchatka, and grizzly bears. Brown bears are also found throughout Europe (albeit in small numbers) and northern Asia. A form of brown bear used to exist in North Africa, but the farthest south the species now penetrates is Mexico.

The species attains its largest size in the northern reaches of its range. In the islands of the Gulf of Alaska, the largest of all bears, the Kodiak, is found. The Kodiak bear can weigh up to 1,700 pounds. In the more southerly parts of the range are the smaller individuals, such as the Mexican grizzly and the Syrian brown bear of Asia Minor.

The brown bears' range extends into coniferous and mixed deciduous forests. Despite seasonal visits to Arctic heaths and tundra, the brown bear is not a permanent resident of treeless regions—except for the grizzly bear of North America, which is found primarily in high, grassy plains.

The last 200 years have witnessed the encroachment of people into the brown bears' habitat and the subsequent deforestation of vast tracts of timberland. With this has come a decline in both the bear's habitat and its numbers. In many cases the brown bear has retreated to forested mountains, a phenomenon which, in Europe, has led to the curious pattern of almost 20 mountain "islands" of bear distribution.

In spring and summer, brown bears may wander above the timberline, where they forage on reindeer carcasses. They will occasionally kill, usually the very old, injured, or sick among red deer, moose, reindeer, and very occasionally, domestic livestock.

In late summer and fall, the brown bear's staple becomes berries and fruit as it descends into the warmer valleys to prepare for winter. In addition, it will eat grasses, roots, carrion, fish, small rodents, insects—and of course, it is very fond of honey.

At about the time of the first snow, after the animal has stored sufficient fat, the brown bear retires to a den which it may use for several consecutive years. This den is usually an excavated cavity under tree roots or near an overhang, and is lined with grasses, tree branches, or moss. Here the bear will remain, dormant, until the spring melt raises temperatures enough to awaken it. It may awaken periodically during the winter, though, to feed briefly, and it is easily aroused if disturbed.

Except for females with cubs, the brown bear is solitary. It usually confines its wanderings to its own territory, though if disturbed by human settlement it may roam over vast regions.

American black bear

Ursus americanus

North America

The American black bear is the only bear species found exclusively in North America. It is also the only species found east of the Mississippi—and as such, is the species sometimes encountered in the mountains of Virginia and western Maryland. At one time, black bears probably ranged throughout the forested regions of North America; but today its range in the U.S. is primarily the spines of the Rocky Mountains, the Sierra Nevadas, the Cascades, and the Appalachians, though it may also be found in Florida, southern Georgia, Alabama, Mississippi, and Louisiana.

The American black bear is the bear most of us are familiar with, for it is this species that is pictured so often begging for food in some of our national parks. In addition, Smokey Bear, the fire-fighting symbol of the U.S. Forest Service, is a caricature of a black bear. The American black bear is probably also the species best known to science, since its importance as a part of the North American ecosystem, a tourist attraction, and a game animal has made it the subject of many studies.

The name "black bear" is one of convenience, as it is not always black—indeed, most are dark brown. In fact, the species exhibits remarkable diversity in color, ranging from jet black through steel-blue, dark brown, cinnamon brown, and even white.

Even though it is usually dark brown, the black bear should not be confused with the brown bear. It is so different, in fact, that at one time scientists placed

it in a separate genus, *Euarctos*. The practice has ceased within the last two decades. Today the black bear is considered in the same genus as the brown bear, *Ursus*, but is specified as *americanus* rather than the brown bear's *arctos*.

The American black bear is generally smaller and less robust than its brown cousin. Its fur is shorter and its feet are longer. Its weight rarely exceeds 300 pounds in the wild, although it may reach much greater weights in captivity.

An important factor in the continuing abundance of the black bear is its great adaptability. It appears to be an opportunist in selecting suitable habitats for itself, and is quite a generalized feeder. In addition, it carefully avoids human settlements, except when forced near them by hunger.

Many people consider the black bear wary and extremely intelligent. Because it has so successfully cohabited with and is tolerant of humans, the black bear is still considered a valuable part of the environment—and this is no accident. Bear populations are carefully monitored and managed to ensure a balance between them and their environment.

In many parts of the U.S., the black bear has come to be regarded as so valuable a resource that some game departments have gone to great lengths to cultivate healthy populations. The state of Louisiana, for example, between 1964 and 1967 imported black bears from an overpopulated habitat in Minnesota and transplanted them into suitable local habitats.

Throughout most of its range, the black bear emerges from its winter



"Smokey the Bear, Smokey the Bear. Prowlin' and a-growlin' and a-sniffin' the air." This one American black bear

has helped to prevent thousands of forest fires in the last 30 years.

dormant period in March and is active until mid-fall. In November it goes through periods of inactivity, and finally becomes dormant for the winter in December. Oddly enough, the life expectancy for males is only half that for females—probably because of the males' greater likelihood of engaging in potentially fatal battles with other males during territorial encounters.

The territory of both males and females has been discovered to be relatively constant throughout their lifetimes, with males' territories being roughly 20 square miles, while females range over as little as two. One male's territory may overlap those of several females, with each of whom he may mate during breeding season. The price

for these amorous rewards must be paid when other, possibly younger and more virile, males seeking to establish themselves may challenge and displace him.

The black bear's diet is primarily vegetation, supplemented with small amounts of meat. It changes with the seasons, but consists generally of berries, grasses, roots, fungi, and sapwood. The bear's consumption of sapwood in the early spring, when often little else is available, can cause considerable damage to timber and is of great concern to foresters in some parts of the country.

Sloth bear

Melursus ursinus

Asia

If one considers the brown bear to be the most "typical" bear, then the sloth bear must be the most atypical. Although immediately recognizable as a bear, the sloth bear differs in having an extremely long and shaggy coat and a very long, tubular snout.

The sloth bear received its name through the error of a museum scientist who believed that the specimen he was handling had come from the long-extinct giant ground sloth, a completely unrelated animal. On discovering his mistake, he declared his specimen the "Sloth-Bear," and the name has persisted, at least among Westerners.

At one time the sloth bear could be found in many different habitats on the Indian subcontinent and in Sri Lanka, always close to water. As humans have encroached upon many of the more open and exposed portions of the species' range, the sloth bear has retreated to predominantly wooded and hilly areas.

The sloth bear does not deviate drastically from the typical bear prototype, but it is substantially more specialized—for eating invertebrates, especially termites. Seasonally, the sloth bear will eat fleshy fruit, leguminous plants, grains, grasses, roots, and tubers. Kills are rarely made, but re-

ports of sloth bears scavenging from the kills of other large predators are common.

It is the consumption of termites, though, that best suits the sloth bear. Its long, powerful claws are ideal for tearing away at termites' cement-hard mounds, and its long muzzle ends in a nose that has fleshy flaps that can be opened and closed at will to prevent

the entrance of dirt and dust while the bear is digging. The sloth bear has lost, evolutionally, its two front upper incisors; in their place has evolved a unique oral cavity which permits strong suction of termites from the mound. The strong claws and the unique muzzle, combined with an extremely protrusible (stick-out-able) and sticky tongue, make the sloth bear



Sloths spend their lives in trees; when this bear was first discovered, it was said to swing through the trees like a sloth. So, a confused scientist at the British Museum, George Shaw, reasoned, it must be a "sloth bear." There's no relation.

the ursine version of the anteater; and indeed it is believed that this creature is never found far from termites. At certain times of the year when other foods are scarce, the sloth bear depends entirely on termites for its survival.

Sloth bears have one or two young in November or December. Usually the female will den alone, and may not eat in the days just before she gives birth. Sloth bears do not become dormant, so after the young are born, the female will resume foraging within a few days. When the cub is six to eight weeks old, it climbs aboard its mother's back and hangs onto tufts of her long, loose hair, much as a monkey infant does. In this fashion the cub travels with its mother until it becomes more independent, usually at 24 months.

The sloth bear has a reputation for being one of the most dangerous animals of the Indian forest. Many travellers have been severely mauled after happening suddenly on a female with cubs, or even on lone individuals. It is believed that the sloth bear has poor eyesight and hearing and, being intent on its foraging, simply does not notice the innocent passerby until the two are virtually on top of each other. The bear then panics and, feeling cornered, apparently sees no alternative but to attack and flee.

The sloth bear's peculiar adaptations have rendered it more vulnerable to civilization's encroachments than any other bear species except the polar bear. This most unconventional of all bears is in dire need of study and protection throughout its shrinking range.

Sun bear

Helarctos malayanus

Asia

Helarctos—literally, sun-bear—is also known as Bruang, Wek-won, and Tsap. It is the smallest and least known of all the Ursidae. Found in modern times in Burma, Indochina, Malaysia, and the islands of Sumatra and Borneo, the sun bear probably evolved from an eastern European ancestral stock in common with both spectacled bears and sloth bears. It is found in moist forests in both mountainous and lowland regions throughout its range, and is probably the most arboreal of all bears.

The sun bear reaches a maximum length of about four feet, and weighs

The sun bear is the most arboreal of the bears—more likely to be found in a

between 100 and 150 pounds full grown. Its ears are small and rounded, and its lips and tongue are quite protrusible, though less so than those of the sloth bear. Its fur is very sleek and short, typically jet black, and there is always a pale patch on the breast varying in size and shape, and in color from cream to orange. It is this patch which gives the species its name.

The sun bear's feet, which end in powerful claws used for both digging and climbing, have completely naked soles, typical of bears that inhabit warmer climates. When walking, the animal appears to be pigeon-toed—like most arboreal animals, and like all bears, it is unable to retract its claws.

As has been mentioned, very little is

tree than to chase someone into one.



known about the sun bear's habits. The little that *is* known indicates it has much in common with the Asiatic black bear, which may be considered the cold-climate version of the sun bear. Sun bears make rough nests in large trees in which they rest and sleep. They feed chiefly upon fruits, roots, and shoots; but since they are swimmers of considerable skill, they may consume fish and aquatic invertebrates as well. They have often been suspected of scavenging the kills of other carnivores, and they will go to endless trouble to obtain honey, of which they are very fond.

One or two sun bear cubs are born following a gestation period of seven to eight months. Of these, only about three months involve actual embryonic development; the rest are the implantation delay so common among all the Ursidae. Sun bears rarely breed successfully in captivity, primarily because the females are extremely sensitive to disturbances following birth. They may live as long as 20 years in captivity.

Spectacled bear

Tremarctos ornatus

South America

The spectacled bear, so named because of the golden rings around one or both eyes, is the only bear species in South America—in fact, in the southern hemisphere. It is believed to be most closely related to the brown bear, but because it has evolved in comparative isolation, the resemblances between the two are quite superficial.

Today the spectacled bear is an endangered species, found only in the

foothills and middle ranges of the Andes from Venezuela to Bolivia. A few odd specimens used to be reported from Panama, but it is unlikely that the spectacled bear could today be found outside the Andes.

Despite its restricted range, the spectacled bear is considered common in some isolated parts of the Andes, especially those with relatively undisturbed primary forests. This bear is very poorly known. So few observations of it have been made by scientists that only one photograph of it in the wild is known to exist. An idea of its general habits has been formed only from indirect evidence and discussion with South American Indians, who still hunt this animal for its flesh.

Known primarily as a forest-dweller, where it consumes fruit, leaves, nuts, and roots, the spectacled bear also makes frequent forays into the high-altitude savannah, where it may make its rare kills of vicuña, guanaco, or deer. It would appear, though, that the spectacled bear is the most consistently vegetarian of all bears. It has very strong and robust teeth and jaw muscles, which permit it to process nuts, seeds, and tough, fibrous vegetable matter without difficulty.

The spectacled bear also appears to be very arboreal. In fact, one was reportedly found 100 feet up in a palm tree, foraging on palm nuts and new leaf shoots.

The spectacled bear appears to be predominantly solitary, coming together only to breed, in December or January—summer in the southern hemisphere. One or two young are born six months later in the winter, during which the bears remain active; cubs probably remain with their mother for the usual two years.



The spectacled bear got its name from the rings of lighter fur around its eyes. Bears' vision is not particularly good, but no one has yet figured out how to give them glasses.

The decimation of wildlife can in most instances be traced to modern destruction of habitat in the search for basic resources. This is certainly true for the spectacled bear, whose range dwindles as the Andes' great forests are consumed. □



Remember, Only You—

J. Fisher

The *Washington Star's* "EAR" never mentions him, and he hasn't made the *Washington Dossier* yet, but he's a genuine Washington celebrity, with his own zip code, three secretaries, and an adoring public. . . .

Who else but the National Zoo's own Smokey Bear, the living symbol for fire prevention?

Like his predecessor, who died in 1976, the present Smokey Bear hails from New Mexico. Until 1950, Smokey was only a poster picture of a bear in pants, wearing a ranger hat and holding a shovel in his hand. But there was a forest fire in New Mexico that year; and in the aftermath, a half-dead cub was found in a charred tree in the Lincoln National Forest.

An enterprising game warden convinced a news photographer to record the sorry remains of the fire, focusing on the place where the bear had been found. The photos elicited an outpouring of sympathy from the public, and an ursine star was born.

When the little black bear recovered, special arrangements were made to bring the cub to the National Zoo to serve as Smokey's embodiment. A wave of publicity preceded the

bear's arrival. He was met on June 27, 1950, by a throng of Boy Scouts, Girl Scouts, Zoo personnel, and official guests. In a town full of celebrities, Smokey soon became a leading luminary—even though he got off to a shaky start at his welcoming ceremonies by chewing up the helmet presented to him by a local fire chief.

As Smokey grew, so did his fan club. A popular song went:

*Smokey the Bear, Smokey the Bear.
Prowlin' and growlin' and a-sniffin'
the air.
He can find a fire before it starts to flame.
That's why they call him Smokey,
That was how he got his name.*

Like any budding star, Smokey began to receive fan mail. A letter-answering program was started in 1953, based on the premise that if children were interested enough in Smokey to write to him, they should receive a personal reply. Bolstering this argument was the fact that letters were coming in from all over the nation. A trickle of mail became a deluge, then a flood. In 1965 Smokey became the only celebrity in the country to have his own zip code—20252.

Last year, Smokey's staff of three secretaries at the Agriculture Department's Forest Service answered about 105,000 letters, most of them asking to be enrolled in Smokey's Junior Forest Ranger Program.

Some letters contain personal obser-

vations and notes. "Dear Smokey," wrote one young admirer, "I am a Junior Forest Ranger but I have to move. There are never any forest fires in Brooklyn."

"I would like to baby-sit for Smokey," offered another fan. "I am nine years old and I am not afraid of bears."

All this attention has benefited Uncle Sam, too. Products endorsed by Smokey, such as T-shirts, records, comics, coloring books, lunch pails, and toys, have contributed more than \$2 million to the government over the years.

Even though Smokey's young fans grow up, and such paraphernalia finds its way to the attic or to a suitable charity, Smokey's message lives on in both child and adult minds: "Remember—only you can prevent forest fires." In fact, Smokey's slogan has become so famous that some posters carry only the message, "Repeat after me, 'only you. . . .'"

More important, Smokey's message has gotten results. In 1942 there were 200,000 fires in the United States caused by human carelessness. By the early 1970s, this figure had dropped to around 100,000—cut nearly in half.

Smokey Bear's success and popularity—in a 1968 national survey, his name was recognized by more than 90 percent of the persons interviewed—

J. FISHER is a Washington-based freelance writer who has covered everything from wildlife to the latest developments in space research.

made him an international figure. Smokey and his relatives pop up on posters in Canada and Mexico—in Mexico, he's known as "Simon El Oso," Simon the Bear. In Chile a puma, shovel in hand, crusades to save forests from fires caused by carelessness.

Nowhere has the authoritative and lovable Smokey been more successful than in the United States. Forest Service officials are quick to point out that after Smokey came on the scene, national awareness of the need to preserve wilderness and wildlife increased dramatically—and has stayed high for almost 30 years.

The National Zoo considers it a privilege to continue being the host for Smokey Bear—the most widely known animal in any zoo in the United States. □



The first animal symbol of forest fire prevention was Bambi. The cartoon Smokey was drawn in 1945—a symbol combining the appeal of an animal with “the ruggedness of a firefighter.” The first live Smokey (right) lived 26 years at the National Zoo after he was found as a cub, burned by a forest fire (above).



Taking Care of Bears

Jaren Horsley

In many ways, bears are easy animals to keep in a zoo. Their needs are simple. Back in the days when captive animals were curiosities, a pit and some table scraps kept a bear just fine. Provided the bear couldn't climb out of the pit, it made a great exhibit. This primitive technique did not change much over the years; it survived all the way into the early part of this century. Concrete made the pit more stable and fresh food replaced the leftovers, but the concept stayed the same.

Some things have happened recently to improve the bear's lot a little. For one thing, the public has become more aware of animals—their biology and their problems. Looking at a bear in a pit is no longer pleasant. Exhibits have begun to look like something a bear might enjoy living in, rather than just a hole in the ground.

A second development has changed the size and design of the bear pit. Animals have become harder to capture, and the message is clear. We in zoos have to explore how our animals can best be bred and sustained in captivity, and the bear's exhibit plays an important part in this.

The need to propagate bears in captivity and its related problems have necessitated certain grouping and denning changes as well. Whatever the upheaval, though, the bears always

seem to do well. They live long in zoos, reaching 20 to 30 years of age, depending on the species; some individuals have even reached 40. Bears are seldom ill, and seem to need no special protection from the weather. Even the tropical forms can tolerate colder climates. It is not unusual for a zoo to keep sloth bears from eastern India in cages with unheated dens.

In fact, dogs and bears are much alike in their needs. This is not surprising, since they are closely related. A kennel—a "dog house"—a balanced diet, and perhaps some water to soak in will do a bear just fine.

The basic difference between dog and bear is that the bear is often quite large and strong, and may not always have the most even disposition. The bear's size and strength mean that its enclosure must be very durable, escape-proof, and safe for the keeper.

Of course, all cages should be escape-proof; but the bear's cage presents us with an interesting paradox. The public's perception of a lion, tiger, or wolf is that it is beautiful but dangerous. If one imagines a big cat escaping, one imagines something lethal at large. The bear, on the other hand, which may weigh two to three times as much as the lion, is often seen as a friendly old hulk who likes to beg for food and warn campers about forest fires. Zoo visitors are often shocked to learn that curators and keepers consider the bear one of the most dan-



Bears often "perform" to get food from Zoo visitors. Despite repeated warnings that popcorn and other treats are bad for bears' health, visitors continue to throw junk food into the enclosures.

gerous animals in the zoo. The polar bear is possibly the most dangerous of all.

Bears are big, fast, agile, and not easily intimidated. They can also be very aggressive. Keepers realize that bears are intelligent, and that if the keeper makes a mistake and gets too close to a cage door, the bear may take a lightning-fast swipe at his or her head. If the swipe connects, it could easily be fatal.

Nor is this rare in the zookeeper's experience. Testing the keeper makes the bear a little different from dogs or most of the big cats. Big cats will, of course, do similar things; but the bear is much more unpredictable. The polar bear is especially likely to make sure its keepers stay on their toes; and the little sun bear of Malaysia has a long-standing reputation for turning on keepers when frustrated.

One major design problem in zoos is how to get the bars off the cages—without letting the public *in*. The bars' purpose is often primarily to keep people out and only secondarily to keep animals in. Substituting a large, moated exhibit for a cage with bars has esthetic pluses, but it has a few minuses as well.

The visitor to any zoo which has substituted moats for bars should be aware of the danger if her or his child were to fall over the edge of an exhibit into the bear enclosure. I have often seen people put their children onto or over guard rails in order to give them a better view. This makes zoo people break into a cold sweat. The problem seems to be that modern animal films have not done enough to turn around



How wide and deep to make a moat and what to put into a bear's enclosure to keep it entertained are only two of many

decisions that must be made every day in the captive management of bears.

the popular notion that wild animals are gentle friends or cartoon characters come alive. If zoo visitors appreciated how very dangerous a bear or any other animal behind a moat is, they would be much more cautious.

From a strictly animal-management standpoint, the moat has additional problems. The animals themselves can fall into the moat, especially if they are young. Nets or hay could be used in moats to break a fall, but both present problems of appearance. Water is a good shock-absorber, but it is expensive to use, since it must be changed or filtered regularly, at great cost in labor or equipment and utilities. And of

course, if a bear falls into the moat, it has to have a way to get out. If it is given a set of stairs to get out of the moat with, it will use them to walk *into* the moat as well.

Bears differ from dogs in another way that should be mentioned. The smaller and younger bears are good climbers. If you build an exhibit with a moat, or with a moat plus walled back-drop, it had better be unclimbable. The spectacled bear and sun bear are both great at climbing walls. It is often necessary to put up an electrically charged "hot wire" of low amperage

to sting the bear and keep it from getting out—though keepers hope the bear never makes it far enough up a wall to test the wire. There are “hot wires” like this in our own sloth bear and spectacled bear exhibits at the foot of Beaver Valley.

Before moats and fences for an animal’s exhibit are designed, records are made of how far an animal can jump or reach. It is then assumed that an animal under stress can exceed its normal capacity. The resulting barrier designs take this assumption into account.

Thus, a bear moat is usually about 14 feet across. The bear can only jump about six or eight feet; and though with a fear-motivated head of steam it might do better, it could almost certainly not make a 14-foot jump. In addition, an animal’s side of a moat is usually slightly lower than the public’s side, so the animal must jump upward as well as outward. This makes it even more unlikely the animal could jump the moat and escape.

Cleaning a bear’s cage is often difficult, since the bear must be shifted either into another cage or into a holding cage or den. It is rare to have a keeper enter a cage that contains a bear, or any potentially dangerous zoo animal, unless the animal has been sedated. Thus, if you want to clean a bear’s cage and the bear itself doesn’t want to move, you’re stuck. Our polar bear exhibit, for example, often cannot be cleaned until Snowstar, our reluctant female, can be persuaded to abdicate. Two weeks may go by before she can finally be closed into a den and the yard cleaned.

A bear’s diet is a little more diversified than that of most carnivores. Lions and tigers eat a special meat-base diet, as do most of the smaller carnivores. The bears continue their dog-like ways as omnivores. However, all bears are not equally omnivorous. The polar bear spends most of its life in the wild feeding on seals, carrion, and fish. In a zoo, this species will be given a diet high in meat and fish, with some vegetable matter added, though some zoos feed them only meat and fish. The spectacled bear of South America’s Andes, on the other hand, is more herbivorous and will eat little meat. Most of the remaining bear species will get carrots, apples, bananas, corn, kibble-type dog food, and a small portion of meat according to individual preference.

Bears’ diets have not previously been considered a problem, since bears hold weight well and live a long time. However, they don’t all breed equally well. The Zoo’s new nutritionist, Olav Oftedal, is studying the bears’ diets and making changes where they are needed, since it may turn out in the long run that low fertility or the inability of mothers to nurse their young has a nutritional basis.

Other needs of bears must be considered in bear management. To a greater or lesser degree, depending on the species, bears need places to climb. Most of them also need a pool to soak in during the warmer months of the year. Supplying the pool is no real problem; supplying climbing material is.

Spectacled, sloth, and sun bears are all good climbers. The spectacled bear is highly arboreal and will spend a great deal of time up in a tree. Young

bears of most other species will also climb trees—in the case of the black bear, as an escape from potential danger. It is thus necessary to put large, dead trees in many of the bear exhibits to give the bears access to climbing materials. The trees can be placed upright, with cross-pieces attached so the bears can get off the ground. Even with the large, non-climbing brown bears, a log or two is provided



The sloth bear, like the sun bear, is a great climber. Its powerful claws are especially useful for tearing through cement-hard termite mounds.

for scratching.

Putting a tree in a bear's exhibit presents a problem. If a log is supplied that can be rolled, the bears might roll it across a moat and use it to escape. If the tree stands upright, it is potentially a hazard if it can be toppled over and used the same way. One must also worry about tall trees growing near the bear cages. Heavy windstorms can knock a tree into a cage—and again the bear can use it as a bridge to freedom.

One phenomenon often seen in bears, as well as in other animals, is that of weaving or pacing. It is often called stereotyped behavior and, it is theorized, evolves out of boredom. This behavior can be seen in our own polar bear male, who swims in a circle in his pool, over and over, bouncing off of the front and rear walls of his underwater arena. He brought this behavior from his old cage, where his pool was much smaller.

Any type of weaving or pacing, whatever its cause or purpose, can detract from an exhibit. Our animal trainers attempt to correct it by teaching the animal other motor patterns that conflict with its stereotyped behavior. With just such distractions, we hope to stop the polar bear's underwater "pacing."

The Zoo is also attempting to halt the bears' habit of begging for food. "Feeding the bears" has become a national pastime, and of course it is great fun. Unfortunately, it makes for fat bears. Despite our repeated requests of "Please don't feed the bears," a bear quickly learns that if it waves or begs, the admiring public will toss it popcorn or marshmallows. Animal trainers are



The Zoo's young male polar bear swims in circles in one small corner of his pool.

Keepers are working to train him into less stereotyped behavior.

trying to teach bears not to beg, in hopes that their diet can remain balanced—but their worst opposition is the bear's sweet tooth and the public's willingness to indulge it.

Up to this point, we have discussed the management of bears in captivity as if the only problems lay in how to

keep the animal alive and healthy. Fifty years ago, this of course was the concern. Now things have changed. In most zoos, propagation programs are the major emphasis.

There are three obstacles to a successful propagation program. The

first is how to get the species to breed in captivity. The second is what to do with the offspring. And the third is how to maintain a genetic diversity that will minimize the loss of essential, heritable traits.

When zoos pat themselves on the

back for having bred a species, they have only dealt with the first of the problems. Once a species is bred successfully, regularly, the placement of babies becomes a problem—and the cold world of reality suddenly appears. Most zoos already have all

the bears they can handle, and they too are breeding several species of bears. In fact, they are probably breeding the same species of bears we are. There is no room for most baby bears in other zoos. Bear cubs *could* be released to the wild—but this is more a dream than a real possibility, at least for the moment.

The bear cubs could also be sent to circuses, animal acts, game ranches, or drive-through zoos; but these alternatives are also quickly saturated. The zoo must in the end decide whether to stop breeding or to euthanize unwanted offspring.

Further complicating the problem is at what stage in the cub's life you can decide it is "unwanted." If conformation to breed standard is the question, you might have to wait until the animal is an adult. As with horses and dogs, zoo animals may be thoroughbred, half-bred, or mongrel. And as with horses and dogs, it is not until an animal is fully grown that it may be determined whether or not it conforms to its species ideal.

Obviously, this is a complex and controversial issue. Even if there were plenty of space for all the animals, one would still have to decide which bears should be bred to which to minimize inbreeding and the loss of diversity. This involves the use of people and sometimes of computers, and it requires a lot of cooperation between zoos.

Propagation, then, is the new concern of captive animal management. It is just now becoming our major problem in the captive management of bears—but considering that many bear species are endangered, it is also our major hope for bears in the wild. □

Please *don't* feed the bears! . . . One bear "was fed to suffocation by the thousands of visitors, and. . . grew so fat that he

could not walk." His weight was estimated at 2,200 pounds before he died in 1899.



The Ascent of Bears

Jaren Horsley

When my mother begins to recount the genealogical details of our family tree, I immediately fall asleep. And the book of Genesis is not my idea of stimulating reading—plowing through all those lists of names and “begats” is like going to your spouse’s office party: you’d really rather be someplace else.

Unfortunately, any article on the evolution of bears stands a good chance of falling into the “begat” category of interest. As you are led back through the Pleistocene, you may start nodding off—and at the Oligocene, I may lose you entirely. In self-defense, I want to remind you of my favorite quote: “There are no uninteresting things in this world—only uninterested people.”

To make things easier, let me first introduce the cast of characters. There are seven species of bears in existence today. (If you count the giant panda, as a few authors do, there are eight; but for the purposes of this article, we’ll consider the panda as family *Ailuropodidae*, not family *Ursidae*—no more than a country cousin to the bear.) Miles Roberts’ article, “The Bear Facts,” in this issue of *ZooGoer* gives an excellent summary of the bears’ names—both English and Latin—and where they can be found geographically, along with their physical char-



Polar bears and brown bears are such close evolutionary relations that they

acteristics, personal habits, and what they have for lunch. So let me just remind you of the English names of our subjects: the brown bear, polar bear, American black bear, Asiatic black bear, spectacled bear, sloth bear, and sun bear.

can mate and produce fertile—if odd-looking—off-spring.

Since time changes all things, it will be easiest for us as we trace the evolution of the bears to work backward from forms we know; then when we find that a branch of the bears’ gene-



Thalarctos. Now researchers believe that all four species are the same genus, *Ursus*.

For the purpose of this article, though, let's ignore all that controversy. We'll start at the top branch of the bears' family tree, labeled "brown bear." Brown bears seem a good place to start, since they are the most widespread on the bear species and are well established.

Working back down the branch and passing backward through time, we come to a point about 30,000 years ago where the branch meets a fork. Only a short way up the new branch are the present-day polar bears.

Thirty thousand years is a flash in the total expanse of mammalian evolution. Thus, polar bears and brown bears are really not very different from each other. It is not surprising that they have bred in the National Zoo and produced fertile hybrid offspring. This has happened more than once, and certainly indicates a recent separation of the forms and a common history. Even though on the surface they appear different, the polar bear and the brown bear are much alike, especially on the cellular level. This should not be taken to mean, however, that they are the same species. Geography, biology, behavior and temperament all play their parts; so though brown bears and polar bears may interbreed in captivity, such an event would be highly unlikely in nature.

Going back to the fork in the tree that joins brown bears and polar bears, we again head downward through time, looking for the next junction. As we proceed, we notice that the brown

The spectacled bear is the most herbivorous of the bears, though, like all bears,

omnivorous. Scientists believe this bear is the ancestor of sun and sloth bears.

alogical "tree" forks, we can work back up the new branch toward the present and see what lives at its tip.

I will start by saying that bears are the most recently evolved of the carnivores (unless you count the pinnipeds, seals and sea lions, as part of the order *Carnivora*), and the various species of bears are only superficially different from each other. In addition, some are more closely related than others. Trying to determine the distance between relatives (whether two bear species are first cousins or only in-laws) is what

causes the occasional, frustrating name-changes found in zoological literature.

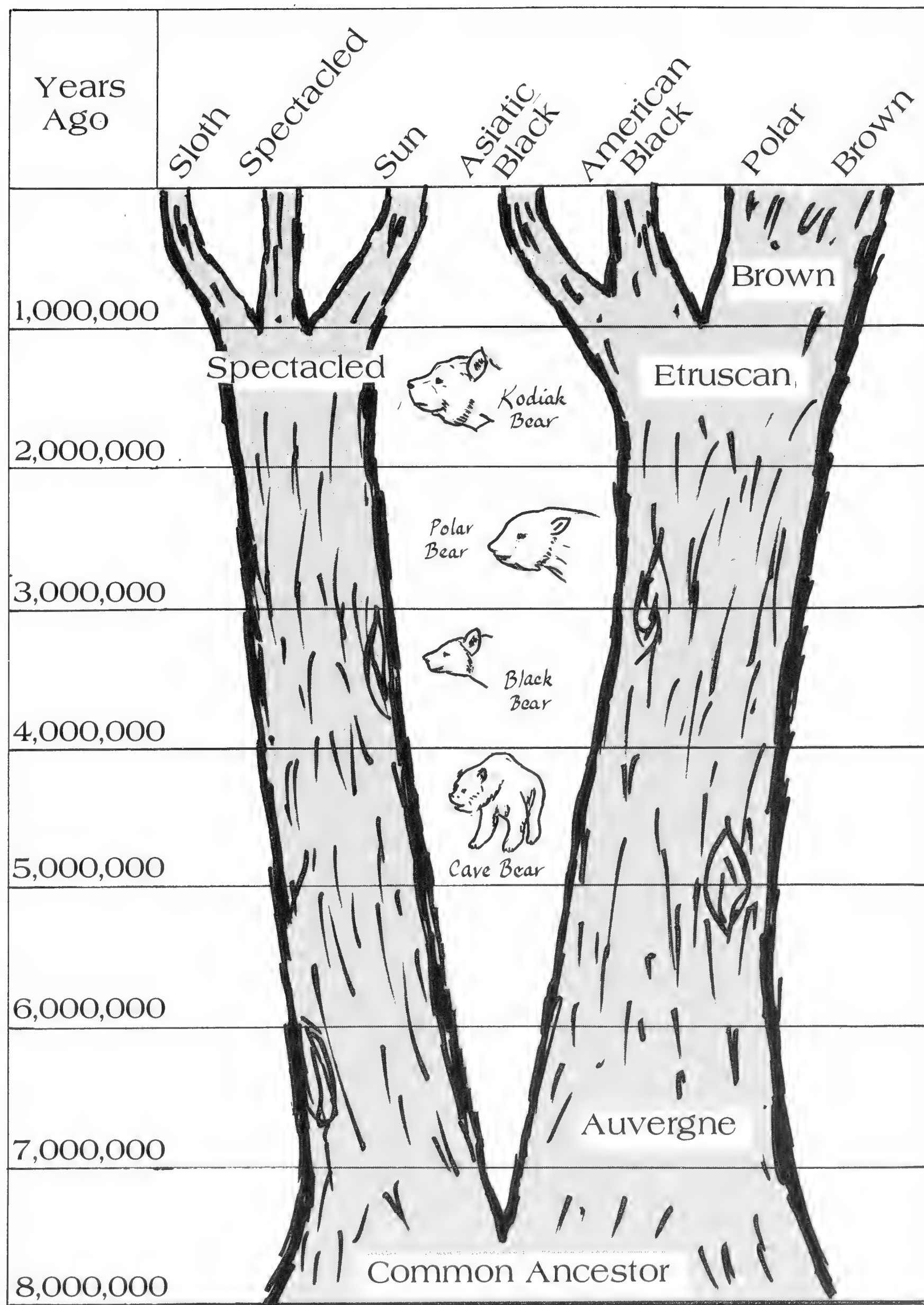
Those who have to use scientific names often ask, "Why can't they stick with one set of names?" The problem is that the name is supposed to indicate the closeness of the relationship. As researchers work through the evolutionary history of bears, they find new data or new disagreements on the distance between lineages. So the names change. For example, up until about 20 years ago, Asiatic black bears, American black bears, and polar bears were thought not to be closely related to brown bears; so their genera were, respectively, *Selenarctos*, *Euarctos*, and

bear changes very gradually in appearance. This very slow alteration makes it difficult to decide when to start calling the brown bear by a different name. At what point is it different enough to say that it is no longer a brown bear?

As we drift downward and debate this point, we find another fork in the tree at about the 1,000,000-year mark (in the late Pleistocene era). This is convenient; since we have been thinking over whether or not and when to rename our brown bear, we will use this juncture to start calling it the Etruscan bear.

During our journey, we noted a few things. While we were looking for information, our search slowly moved from North America across the Bering Sea to the old world. What we found was that about 30,000 years back, at about the time the brown bears and polar bears branched, there were no bears in North America; we could only find them in Europe and Asia. In addition, we didn't really see the gradual changes in the bears, since the information came only in bits and pieces, and the further back we went, the fewer pieces we found.

All this helped us make our decision about naming the Etruscan bear. If the brown bear's evolution had been as continuous as we at first claimed, the change of name would seem totally arbitrary. But instead of easily following our metaphorical tree branch, we instead are picking up bits of twig and bark and piecing them together. This way, we can give a separate name to each fragment; but it is important not to lose sight of the fact that the tree branch at one time really *was* continuous, and in many cases the names



The fossil record is far from complete, but scientists believe the bear's "Roots"

go back at least 8,000,000 years.



really *are* arbitrary.

The Etruscan bear, a small animal, now stands before us at the fork of the tree. To find out where the other branch goes means backtracking a million years to the present. This tedious task is worthwhile, since we note that in this direction the Etruscan bear takes on the appearance of the well-known black bear. At the 750,000-year mark, this branch divides again, and we trace each branch to find the closely related American and Asiatic black bears.

Now we can go back down to where we left the Etruscan bear. We must go deeper, since some of the bear species have not yet been traced; but after the 1,000,000-year mark, things get rough and the record becomes murky. From here on, we shall have to hold hands and fumble in the murk a little, as we enter the middle kingdom, the Pleiocene.

Descending the Etruscan branch down to 7,000,000 years ago, we come

to a small and hardly recognizable version of the bear. This is another good time to rename our animal—we will now call it the Auvergne bear. Since there is no fork here and this bear is just a fragment of the branch, we proceed downward.

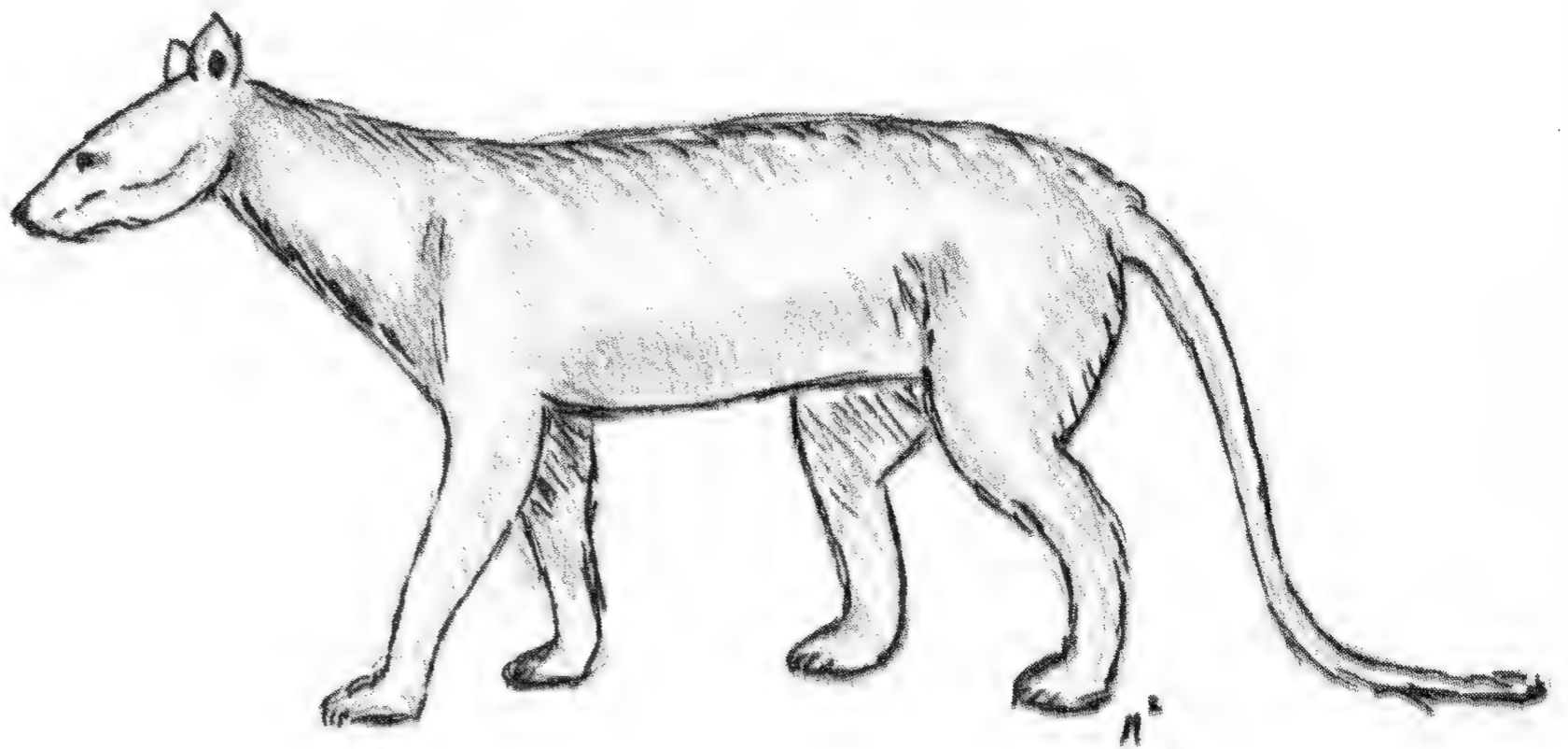
We quickly—at about the 8,000,000-year mark, give or take a million years among friends—come to a fork which, if followed upward, would take us to the spectacled bear, and much later—oh, say, at maybe the 1,000,000-year mark—the sloth bear and the sun bear. Information on this side of the tree is very hard to come by, since the fossil record is poor. By starting with the brown bear's branch of the genealogical tree, we made a wise choice.

It's dark down here near the tree-trunk, but I am determined to find where and when bears stop being bears and become something else. To do this, we have to go back between 20 and 30 million years, to the late Oligocene

or the early Miocene eras, where we find some dog-like bears—or bear-like dogs. Some of these creatures are called *Hemicyon*, *Dinocyon*, *Amphicyon*, and *Cephalogale*. That's about it. The dog family had already been around a few million years or so; these creatures are the ones that parted from the canids and were part of the lineage that later became bears.

To go back any further than this would serve little purpose, since the creatures we would trace are too-distant ancestors to be of any value in learning about bears. Is anyone really interested in the insectivore ancestors that "begat" all carnivores, or the ictidosaur that "begat" all mammals? It would be better to quickly return to the present with our now-somewhat-clearer picture of the seven species of bears and their family tree, and call it a day.

So much for genealogy. Tennis, anyone? □



Amphicyon, a dog-like bear—or bear-like dog—is one of the bear's earliest ancestors. Above, the brown bear is the

widest-spread and most representative of the bear species.

Busy as a Beaver Valley

Daryl Boness

Over the past ten years, or so, construction of new facilities or re-modelling of old ones has become a common sight around the National Zoo. Beaver Valley, in the center of the Zoo, is the most recent product of this process.

Remodelling of old exhibits and construction of new ones may occur for a variety of reasons. First, there may be a change in the general philosophy of a zoo as a result of the continuing flow of information from scientific research or public opinion. Second, the old exhibits may have deteriorated to the point where it is more costly to repair them than to redo them. Third, changes in government regulations regarding captive animals may require changing exhibits to meet new specifications.

Visitors to the National Zoo should notice immediately that a change in philosophy has taken place over the last decade. All through the Zoo, enclosures are larger and more open wherever possible; the intent is to make each exhibit as close to the animal's natural environment—and as attractive to the visitor—as possible, and at the same time to be able to keep the ex-

DARYL BONESS came to the Zoo in July, 1978 as curator of aquatic animals. Before that time he spent four and a half years studying grey seals, with Sable Island, Nova Scotia as his base of operations.



Beaver Valley opened officially on May 4, 1979, to enthusiastic FONZ friends

and Washington well-wishers.

hibit clean. Beaver Valley is a fine example of what this philosophy can mean.

Many readers will remember Beaver Valley as it used to be. At the lower end there were chain-link-fenced enclosures for cape hunting dogs, dingoes, coyotes, and timber wolves. Next came a concrete pool with sea lions, and then a terraced yard, with a pool and dam, with beavers. The beavers, however, were such inconspicuous

cheetahs are so inconspicuous that many zoogoers do not realize their yard is an exhibit at all!

As is typical of all major projects, the plans for Beaver Valley evolved over several years. For example, there was originally a proposal to have a series of pools with several species of sea lions and seals on display. It was later decided to display a single species each of the sea lions and seals. This would allow the Zoo to build larger

Rather than building obtrusive concrete structures, the new architect suggested building exhibits that would mold into the contours of the valley. Holding pens and filter buildings would be camouflaged as much as possible by rock-work and foliage. The new plan emphasized naturalness and openness in Beaver Valley's exhibits and was acceptable to everyone. By the end of 1976 the design of the new Beaver Valley was complete.



"Rock" made of a combination of fiberglass and concrete is lighter, easier, and

more flexible to work with than real rock—and it's indistinguishable from the real thing.

animals that over the years the Zoo experimented with including other animals in their exhibit—at various times, tapirs, anteaters, swans, and turtles. In the middle of the valley were agoutis, raccoon dogs, cheetahs, otters, crocodiles, and caimans.

Some of these exhibits were torn down in 1972 and 1973. The rest stayed until the beginning of the new construction in the fall of 1977. The cheetah yard is still there—but some changes will eventually be made; the

exhibits for them and eventually to establish breeding colonies in each exhibit.

Not surprisingly, designing a zoo exhibit takes more than a few months—and rarely is the first design acceptable. There are too many complex, inter-related factors to be taken into account. The first architect hired proposed massive concrete structures that would protrude from the sides of Beaver Valley and distract attention completely from its beautiful landscaping.

Finally a new architectural firm, Kent Cooper Associates, was hired.

Between the time the design for the valley was accepted and fall of 1977, the details of each exhibit were worked out by members of the Zoo's curatorial staff. The planners were faced with such major considerations as how the water should be treated to reduce its bacterial content and how the beaver pond should be designed to improve the chances of the beavers' building a dam across it. At the same time, the planners had to think about more mundane things—where water faucets

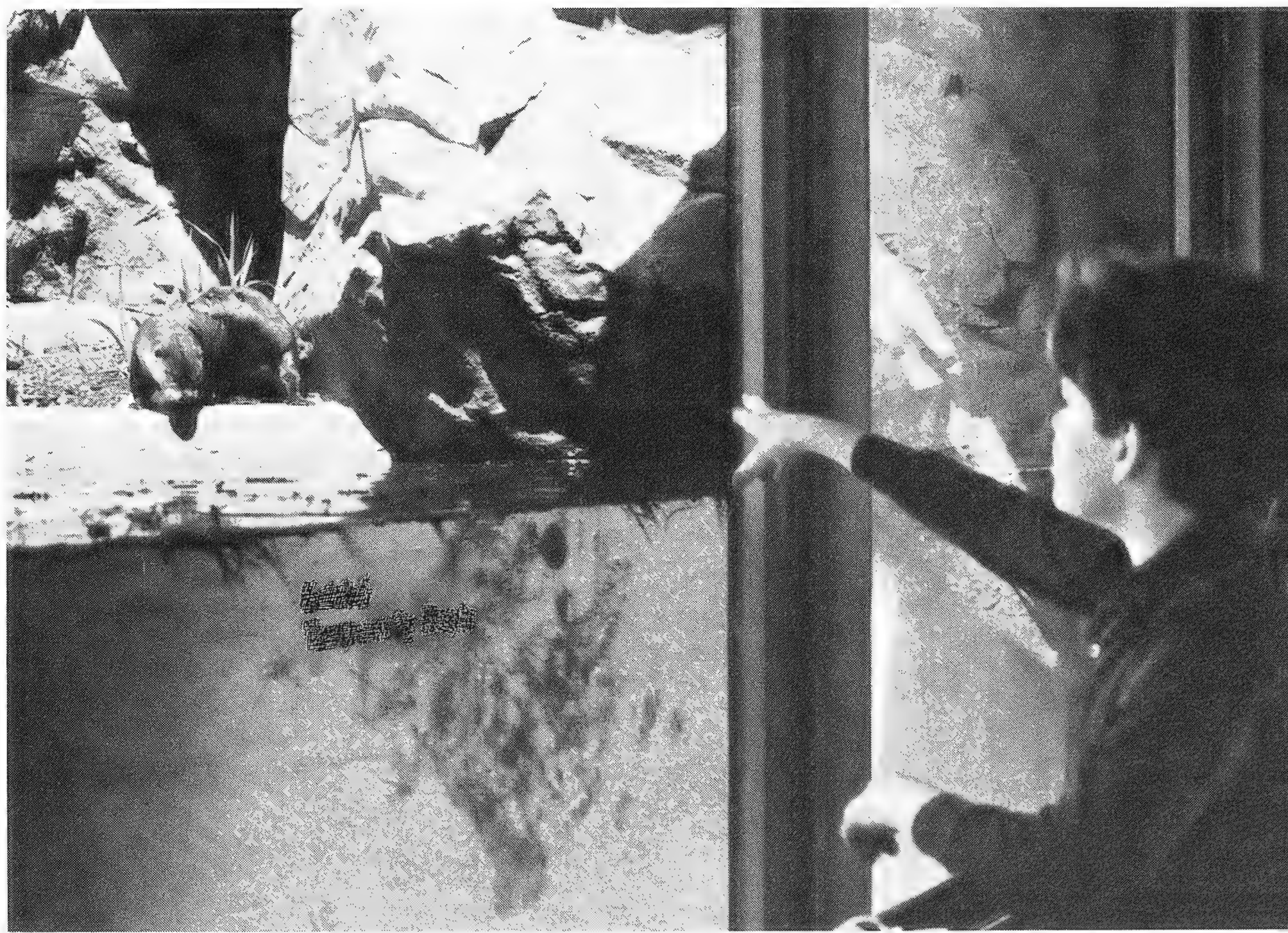
and drains should be located, and so forth.

Invariably with a task this big, not everything is thought of; changes have to be made. A good example of this is the seals' and sea lions' food preparation room, which was left out of the original design. Fortunately, it was possible to add it to the plans without too much trouble. However, the keepers who use the room must be fairly slim—it is no more than three feet wide!

Another change made to the original plans was the addition of grottoes on the grey seal beach. The Marine Mammal Commission felt that more areas were needed for shade than had originally been designed. So the rock-work in the background was modified to include two ledges that protrude over the seals' beach and give shade.

This modification in the rock-work was relatively easy—because the rock, as you would discover if you tapped on it, is not real. Most of the "rocks" in Beaver Valley are made of fiberglass and concrete. For example, the section of rock-work along the back of the sea lion and seal exhibits was built first by spraying latex on the side of a real rock cliff. The resulting rubber mold was then used to cast the artificial structure.

The new sea lion exhibit should be a delight to its inhabitants. The pool holds 450,000 gallons of water, is about 135 feet long, and is as deep as ten feet. The almost 1,300 square feet of beach area simulates the rocky beaches where these animals make their homes in the wild. The exhibit should be a zoogoer's delight as well—not only is there underwater viewing, but there is also



Both visitors to the new enclosure and its inhabitants find the underwater viewing

window otterly delightful.

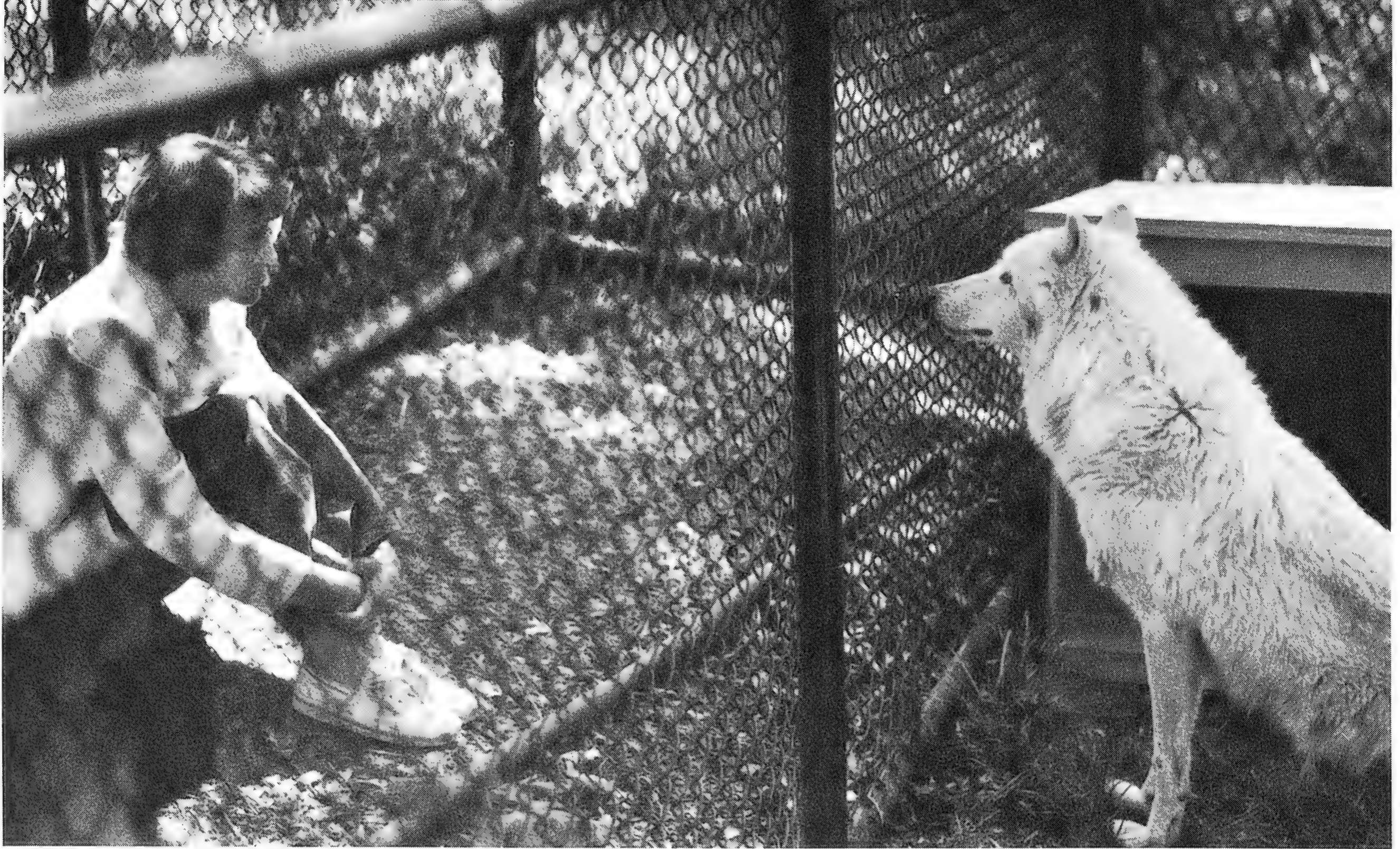
ample space for people to sit and watch these active, interesting animals.

The National Zoo's two male and five female sea lions had all been malnourished pups when retrieved by California's Marineland through its special rescue operation. By the time the animals came to the Zoo in October 1978, a little over a year later, they were in excellent health.

The grey seals (two males and one female) which arrived at the Zoo in mid-January 1979 had been with the U.S. Navy in San Diego most of their lives. Two of the animals were captured as pups on the pack ice around Iceland; the third was taken as a pup

from Sable Island, Nova Scotia—also a chilly beginning, as I can attest from experience!

The Navy had been trying to determine how well the seals could be trained to perform certain underwater tasks. Among these were: to discriminate between aural tones of different frequencies; to open and close valves; and to attach a marker balloon to an object under water. Although the seals were able to perform most of these tasks, the Navy decided that sea lions were easier to train; it therefore terminated its program with the



FONZ volunteers kept watch for several days to make sure that the new enclosures in Beaver Valley really do enclose.

grey seals and sent them to us.

The seal exhibit is similar in design to the sea lions'. It is smaller, however, and does not have underwater viewing. The pool holds 125,000 gallons of water and is about 85 feet long; the beach area is just slightly over 1,000 square feet.

The other four species of animals that occupy exhibits in Beaver Valley include a captive-born pair of otters, male and female; a pair of adult timber wolves; a bush dog from the Zoo's Conservation Research Center at Front Royal, Virginia; and a pair of beavers, a gift to the Zoo from the Canadian government.

All of these species were quarantined before they were moved into their new homes and allowed to adapt to them. Quarantine is a usual zoo procedure and typically lasts 30 days after a new animal arrives. It ensures that the animal will have a healthy beginning in its new environment.

The openness of the exhibits at Beaver Valley has also required an initial period of continuous observation to make sure that we haven't missed any places where animals might escape. Before we put the animals in the exhibits, we made numerous inspections of the exhibits for potential escape routes. Still not wanting to take any chances, we arranged, for the animals' first few days in their new homes, to

have FONZ volunteers watch the animals—a "fail-safe" procedure.

Some of the special highlights of the wolf, beaver, and otter exhibits include a large yard for the wolves, an artificial beaver lodge with a viewing window, an underwater viewing window in the otter exhibit, and streams running into the pools in both the beaver and otter exhibits. We hope that our attempts to make the exhibits more natural and pleasant for the animals will also make them attractive and informative for zoogoers.

Most of the animals in Beaver Valley are not yet fully mature. As soon as they are, we will attempt to

breed them. To the extent feasible, we hope eventually to keep the exhibits at Beaver Valley filled with mixtures of adults, immature animals, and the current year's young.

Because of my background in the biology of pinnipeds (seals and sea lions), I was hired to oversee the operations and programs. Kayce Cover, an experienced marine mammal trainer, is keeper leader. Pat Larkin, Lisa Stevens, and Lisa Burton are the three keepers.

All of us in Beaver Valley—keepers and engineers alike—have learned how to use scuba gear, and eventually will be certified divers. This will allow us to clean the large pools without having to empty them. Inevitably, there will be times when potentially damaging debris will be thrown into the pools: there are many recorded instances of marine mammals having died from swallowing such items as coins, plastic bags, keys, etc. Though we hope not to encounter such serious problems, we will, as divers, be able to put on our gear and retrieve objects in the pools before they can hurt the animals.

The keepers are also learning to train the seals and sea lions. For many people, "training" brings to mind the shows done by such large oceanariums as SeaWorld; but entertaining the public is not the only reason to train marine mammals.

You must remember that the seals and sea lions at the Zoo are wild animals. It could be quite difficult to get an untrained animal out of its pool

Seals and sea lions are taught to touch their noses to a trainer's fist in a process called "targeting." Targeting is a fundamental part of the pinniped training program.

if it chose not to oblige; and the fact that the seals' and sea lions' "cages" are water-filled imposes unique constraints on the animals' management and handling. Further, an animal could become traumatized if it had to be restrained physically each time a veterinarian needed to examine it.

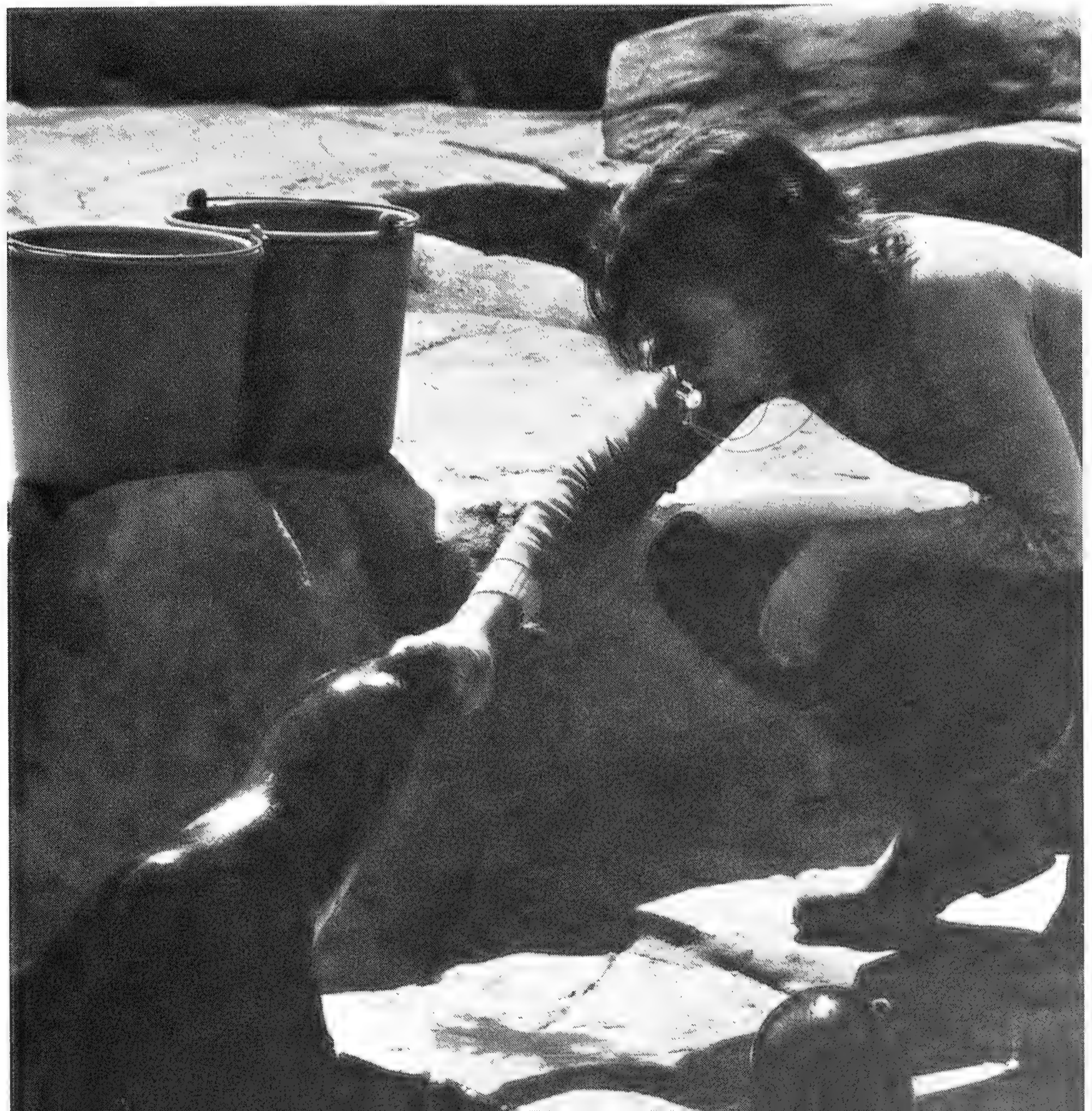
By applying some of the basic principles of operant conditioning—a process derived from the psychological school of behaviorism—one can train the animals to come out of their pool (or go into it) on command. They can also be taught to lie still while someone checks them over or takes a blood sample.

(Ed. note: Emily Rudin's article, "Back-

stage with the Seals and Sea Lions," in this issue of ZooGoer, contains a fascinating discussion of both the diving training and of the animals' training.)

The only other project planned for Beaver Valley's near future is the beginning of a research program. This will, however, have to await the establishment of a routine in the exhibits' general operation.

It takes a long time for a large, complex exhibit like Beaver Valley to be completed. Now that Beaver Valley is a reality, all of us here are excited and hopeful—and anxious to share with zoogoers our pleasure in the unique and fascinating animals who are at home here. □



Backstage with the Seals and Sea Lions

Emily Rudin

In the holding area behind the sea lion exhibit at Beavery Valley, water is splashing, sea lions are barking in hoarse coughs, flippers are slapping on the poolside pavement. "Pool party!" keeper Patricia Larkin jokes. Sure enough, the lively activity of the sociable sea lions does remind you of a summer swim in someone's back yard.

It is four o'clock in the afternoon: feeding time. Keeper Lisa Stevens is tossing large pieces of sea trout from a pail into the pool. The sea lions glide and dive for the fish in seemingly effortless motion. A new fish hits the water. Suddenly two dark forms collide and battle for it—one wins. "That's Rusty," explains Kayce Cover, keeper leader at Beaver Valley. "He's half as big as Norman, so he has to work twice as hard to compete with him." She adds that she can't always tell the sea lions apart by their appearance; often it's by their behavior. "Pearl over there, for example, is very shy," she remarks, pointing to a light brown, smallish female sitting quietly on the sidelines. Pearl fits Kayce's description exactly.

EMILY RUDIN has been a writer-editor with the Zoo for four years. This article reflects months of research she did on Beaver Valley for, among other uses, its exhibit materials.

Another sea lion slides through the water and places its muzzle against Lisa Stevens' fist. "Good boy!" she tells him. She reaches into the pail and rewards him with a fish. This "good boy!" and reward happen often. They're one component of a training routine in which the sea lions are learning to "target" their noses to the keepers' fists.

The Zoo is training these animals for several reasons: to let them get to know the keepers; for maintenance and control, i.e., for such needs as getting the sea lions in and out of their holding area, having them hold still when blood samples are taken, and hand-feeding them; for eventual demonstrations for the public; and to help occupy the animals' time and energy.

Next door, the grey seals are also being trained, for much the same reasons. Although they had once been trained by the Navy in California, their routines had entirely different purposes. Moreover, the Zoo's staff still needs to develop a rapport with these seals.

Training is mainly the keepers' responsibility, and the procedures take time and patience. While training is an integral part of the sea lions' and seals' maintenance, it is not absolutely necessary. Thus, with the Valley in full operation, training is a special project for keepers to pursue in their spare time. Daryl Boness, curator of

aquatic mammals, says that "the keepers are enthusiastic about the training, so they're doing as efficient a job as possible in order to have some extra time left over for special projects like this."

If you attended one of these training sessions, your ears would ring—a whistle is blown frequently. This is the main communicator, the positive reinforcer; it signals a reward for the desired behavior.

The technique, used for polar bears, seals, and sea lions alike, is called operant conditioning and goes like this: when you catch the animal doing the right thing, you blow the whistle at just the right moment to show the animal what you're rewarding. You usually follow the whistle with a piece of food, but food is the positive link, not the reward itself. The timing of the whistle is the most important communicator—and, as the keepers will readily tell you, you've got to have a quick response!

Before the daily program of training the animals began, keepers learned its mechanics by practicing training each other—without using words. (This is

California sea lions play follow-the-leader: if one goes down to the underwater viewing window, the others follow; if one jumps onto the island to sun itself, the others all do the same.





Rusty, a young male, is the most curious of the Zoo's seven sea lions. Because he is smaller than Norman, the other male, he must be twice as bold and work twice as hard in order to compete.

hard—try it yourself!) From this experience keepers learned to be perceptive about the animals' view of what keepers were doing and what was wanted. Keeper Lisa Burton concedes that "I would almost give the animals credit for catching on more quickly than we do."

The polar bears are being trained at Beaver Valley too, for a few minutes a day. This work will allow keepers

to control the bears' entrances and exits to and from their dens. Just as important, it will encourage the bears' use of their entire enclosure and break up stereotyped behaviors by providing new outlets for their energy as well as lots of human contact.

In training these animals—as well as in caring for them—the keepers have been working at building trust and a personal bond with them. But the keepers have come to realize that these are very complex animals, with individual personalities and temperaments. Keeping them comfortable and healthy requires all the skill and intuition a keeper can muster. "They're not so simple as everyone thinks," Kayce says.

Public demonstrations will be given frequently this summer. According to Kayce, who is in charge of them, four basic themes are proposed. First, a presentation on training in the Zoo will encourage audience participation: a visitor will be trained just as the animals are. A second theme is natural behavior and adaptation among pinnipeds. Third is the animals' working relationship with humans; and last is a comparison of seals and sea lions. These demonstrations should prove highly informative and entertaining for the visitor to Beaver Valley.

Long before Beaver Valley's official opening, Zoo staff members were monitoring its operations closely on an experimental basis and modifying certain aspects of the operations as needed. One of the most important of these is the water system. Basically a closed, recirculating series of falls and pools, the water supply and the way it works are of vital concern to both the animals and those who must maintain them.

"If something goes wrong with our end, it's almost like having an animal's life in your hands," says Harold Heist, one of the engineers assigned to the boiler room at Beaver Valley. "Being an engineer in the boiler room is even exciting at times. You learn something about the animals. It's certainly more than most engineers might get to experience."

Part of Harold's responsibilities is the tremendous underground pump system that swishes around the thousands of gallons of water needed not only for the seals and sea lions, but also for the beavers and otters. Besides keeping an eye on the mechanical systems, he must backwash the filters. This means flushing the organic debris that has accumulated in the pools into the sewers and cleaning the strainers. This is done about every week to nine days, whenever a 15-pound pressure differential is reached between the filter head and the outflow filter.

Backwashing is essential to the safe maintenance of the system and for the animals' health; an accumulation of detritus can ruin the filter and, ultimately, burn out the machinery entirely. In addition, water that's dirty or full of debris is not only unhealthful for the animals, but could cause them undesirable stress as well. When filters are backwashed, some water is lost with the organic debris, and the pool must be filled back up; "topping off" the pools is another of Harold's duties.

If keeping the water flowing properly is one concern, keeping it free of bacteria is another, related concern. Chemical control of the water is a tricky new art that is taking time and experimentation to master. The Zoo

has been using chlorine to disinfect the water, but a few problems have resulted because of chlorine's tendency to form toxic compounds, known as chloramines, with nitrogen. (Nitrogen enters the water through the animals' urine and feces.)

Amid the whoosh and whir of pipes and pumps, needles on sensitive analyzers in the pump room measure the free chlorine levels. This is done through electrodes that work on the oxidation-reduction principle. In addition to this machine, "DPD" tablets (diethyl-p-phenylenediamine, an organic reagent) independently test the combined and dissociated chlorine ions. (The analyzer readings ought to correspond with the DPD readings—but for some reason, they don't. Staff members are studying this problem to find out why and see what adjustments can be made.)

Two separate pH meters monitor the acidity of the water; the dissociation of chlorine ions is pH-dependent. At a pH of 7.0, chlorine dissociation is low, and the water is more thoroughly disinfected. This pH level, however, is not considered good for seals and sea lions. Thus, the Zoo maintains its water's pH level at a slightly alkaline 7.5, which is better for the animals, though less thoroughly germ-free.

Other ways to disinfect the water without producing toxic residues exist and are being investigated. Dissatisfaction with the use of chlorine may prompt the Zoo's staff to consider using such alternative disinfectants as ozone or ultraviolet light.

People sometimes wonder whether there is salt water in the pools. No, it's plain, fresh water. There is some

question as to whether fresh water might cause skin and eye problems; but these also occur in salt water. No one has, as yet, done adequate research into the interesting question of whether salinity affects the incidence of skin and eye disorders.

Meanwhile, Kayce keeps a daily chart on the condition of the seals' and sea lions' eyes. "Esther's right eye is about a '2,'" Lisa Stevens reports. "It's pretty cloudy." Kayce draws a pair of elliptical eyes in her notebook, marks a "2" in the right one, and next to it writes "Esther." A "1" indicates a slight film on the eye; "2" means cloudy; "3" signals a hard, white spot, perhaps an ulcer—Kayce also marks its

Keeper Lisa Stevens confers with a Zoo engineer about the workings of the pump room. A vast underwater network of

location in her diagram. From the charts, curator Daryl Boness can decide whether veterinary consultation or treatment is needed.

"Total maintenance" is Beaver Valley's exciting new concept; the idea is to ensure better water control and the smooth daily operation of the whole exhibit. To this end, everyone working at Beaver Valley is specially trained in overlapping areas of technical expertise. The animal staff members know how to backwash the filters; the engineers understand exhibit maintenance. In an emergency, the Zoo can rely on a combination of any of these people to keep the facilities running properly, without having to

pipes analyzes, filters, and recirculates the 632,000 gallons of water needed for all the Beaver Valley pools.





Sea lion demonstrations that focus on feeding and training techniques will happen regularly in Beaver Valley. From

left, keepers Lisa Burton, Pat Larkin, Kayce Cover, and Lisa Stevens.

contract outside assistance.

The two engineers, in fact, are learning to scuba-dive right along with the animal staff. This will enable them to keep the pools clean without the costly dumping of water each time foreign objects enter the pools.

"In taking these lessons and diving underwater," Daryl reflects, "you get a feeling for what it would be like to be a seal or a sea lion." These animals are naturally adapted for diving underwater. They can conserve oxygen, and thus stay down, much longer than we humans can. They can slow the action of their hearts, thereby altering their

blood flow: a collapsible trachea and rib cage reduce the air space inside their thoracic cavity.

Humans, on the other hand, have a cavity that can't collapse; as we go underwater, the pressure increases and squeezes our lungs, causing great discomfort. Humans must *learn* to equalize the pressure in their ears and to control their breathing while they are under water; pinnipeds do it naturally. Comments keeper Lisa Burton: "What's going to take us eight weeks of sweating hassle to learn, they're born with. Instead of having their adaptations, we have to use artificial means—equipment, knowledge, memorization, and practice. After all this," she adds, "you develop a tremendous respect for the oxygen you breathe every day."

Learning to dive also has its dangers—for humans, that is. "Even in a pool with a maximum depth of ten feet," says Daryl, "you must still observe the rules and regulations of diving. They are the same in a pool as in open water. You can get the 'bends' or embolisms even in a pool this shallow. You *must* know what you're doing."

The "bends" are a well-documented syndrome. Nitrogen, a gas, dissolves into the blood at certain pressures. If a diver resurfaces too fast, the nitrogen will form bubbles in his or her joints. This hurts—a lot. It can also cripple. Similarly, if the diver doesn't let out air properly while submerged, oxygen bubbles—embolisms—form in the blood. These can kill.

Other perils include hypoxemia, when a person blacks out because of

lowered levels of oxygen in the blood, and the common cold, a very serious hazard in skin diving. An earache, stuffed-up sinuses, a runny nose, or other cold symptoms make it next to impossible for the diver to equalize pressure between the water and her or his body.

To protect against cold, the diving class wears "dry suits" when the water is cool (30° to 50°F.). These suits are watertight; a layer of air insulates the diver against the water. When the water is warmer (50° to 70°F.), the class wears "wet suits." With wet suits, the water comes in under the suit against the skin, and the diver's body warms it up. The suit, in turn, insulates this inner layer of warm water against the colder water outside. Masks, tanks, snorkels, and flippers complete the scuba diver's outfit. ("Scuba" is an acronym for "self-contained underwater breathing apparatus.") How much easier to be a pinniped!

A pinniped's grocery list at the Zoo is blessedly simple as well: one hundred percent fish! But if you think you've seen one fish, so to speak, you haven't seen them all. Every fish that arrives at the Zoo must be inspected carefully. The relatively fatty fish—mainly sea trout, a moderate supply of smelt, and whiting, mackerel, and butterfish for variety—come frozen solid, in 25- and 50-pound boxes, from a plant in Baltimore, 40 miles away. This fish has been frozen either at the plant or previously on the fishing boat. Every specimen must be thawed to be inspected. If it has been thawed and refrozen, the inspection will discover it; refreezing contaminates fish, and the

keepers must get rid of it. "Since the only thing these animals eat is fish, we just can't feed them bad fish," Daryl explains. "With freezing and thawing, fish deteriorates even faster than meat does. Rather than take the chance, we throw it out." Nor are leftover fish ever on the menu—they're thrown away at the end of the day.

The animals' piscine delicacies are safeguarded in blast freezers at very cold temperatures of -20° to -30°F., for no longer than three months. To limit bacterial growth, keepers thaw the fish in water, then cover them with ice to

prevent dehydration and put them in the refrigerator.

What gold-star qualities must a frozen fish from Baltimore display before it can finally reach the waiting seal or sea lion at Beaver Valley? Each morning keepers examine the fish and check for bright, bulging eyes (sunken ones are not acceptable); blood in the vessels of the eyes; reddish gills (not whitish); moist skin; and no odor when the fish is cut. The skin is also an important indicator. If it is punctured or torn, bacteria have already contaminated the fish's insides, so any fish



Seahunt it's not; but scuba diving allows keepers and engineers to clean the pinnipeds' pools without having to

drain them. Draining both pools would require disposing of 575,000 gallons of water.



This sea lion is watching the approach of its lunch. Sea lions eat an average of six pounds of fish a day and are very

with split skin is immediately thrown out. The fish's composition must also have the right proportions of protein, fat, and water. A generous amount of fat in the diet helps the seal or sea lion to maintain a healthy layer of blubber. The water content in fish is important, because the only way these animals can "drink" water is from the fish they eat.

Once the fish passes these rigorous tests, it is either given to the seal or sea lion as a reward in training or presented at mealtimes. Feeding takes place once or twice a day, depending

conservative about the kinds or cuts of fish they will accept.

on the length of that day's training session, the animal's activity level, and the temperature.

Seals each consume an average of 15 to 25 pounds of fish per day. A sea lion eats an average of six pounds of fish daily—about three pounds if the weather is warm and up to nine or ten pounds if it's cold. "Many times," says Kayce, "sea lions have to learn to accept new kinds or cuts of fish after having gotten used to other types—they're very conservative!" Many of the fish are fed to the seals and sea lions whole, especially the smaller smelt; the rest are cut into bite-sized chunks.

Since pinnipeds are not picky eaters, Zoo people have to be picky *for* them. Watching a seal or sea lion grab a tossed fish and chomp it down in mere seconds will quickly convince you of the ultimate value of the Zoo's "Cordon Bleu" fish-selection process.

The Zoo's seals and sea lions are also treated to daily diet supplements. Salt tablets are added to their fish. One hundred milligrams of vitamin B₁ are another extra. The enzyme thiaminase breaks down when fish are frozen. This leads to a thiamine deficiency if B₁ supplements are not added. Lastly, multiple vitamins provide added insurance against nutritional problems.

To improve their knowledge of the complex science of pinniped-keeping, the keepers are working on several research projects. Pat Larkin, who is responsible for the beaver and otter exhibits, is also gathering information on marine-mammal conservation. Lisa Burton, the polar bear trainer, is studying the chemical control of water. Lisa Stevens is a "pinniped librarian": she is organizing a literature survey of various behaviors of seals and sea lions. With this range of information, the keepers hope to improve keeping techniques, adapt the exhibits more closely to the animals' needs, and share some of these concepts in the animal demonstrations for the public.

You, the visitor, have only to watch a seal or sea lion in Beaver Valley—resting on its beach, disappearing nose-first into the water, or gliding gracefully in its pool—to see the results of the behind-the-scenes care and effort that the Zoo staff invests daily in these delightful, challenging animals' health and comfort. □

Beaver Valley Who's Who

A Thumbnail Guide to Each Species

Mary W. Matthews

Canadian beaver

Castor canadensis

North America

The beaver is a rodent—in fact, the second largest rodent there is (the largest is the capybara). It should not, however, be confused with its cousins the domestic pests, rats and mice.

Up to three and a half feet long, one foot of which is its broad, scaly tail, the beaver is renowned for the quality that makes household pests of its cousins: chewing. The bark of trees makes up the principal part of the beaver's diet, particularly the bark of the aspen and willow. The denuded tree trunks can then be chewed through and the tree toppled and used for dam-building.

It is, of course, the beaver's dams for which this rodent is most memorable. The dams fill the beavers' needs and do their job so well they have been called textbook examples of perfect functional engineering.

Beavers live on and near fresh water, preferably running water. They occasionally make their homes in a burrow on a riverbank. They apparently prefer, however, to build their own beaver pond by damming a

MARY W. MATTHEWS is the editor of **ZooGoer**.



In its new enclosure for only five minutes and this beaver is already in-

river or stream until it backs up. The dam is built of two- to six-foot-long sticks and mortared with mud. It generally reaches two feet or so above the water line, and is conical.

The beavers build the dam first. They then make their home, called a beaver lodge, by chewing into the dam. Solely by chewing, they excavate a large central chamber above the water

vestigating the dam keepers began for it.

line and several underwater emergency exits. The main chamber also has a vertical chimney for ventilation.

The beavers then build secondary dams upstream and downstream from their lodge, sometimes for little apparent reason other than to be building. The beaver's dam is comparable to

anything a human could design—and in fact may be kept in *better* repair!

None of this, however, should lead to any deductions about the beaver's intelligence. The beaver has long been thought to be more intelligent than other rodents because of its dam-building marvels. Today, however, most naturalists believe that its successes are based on a combination of instinct and trial-and-error. In fact, it is not unusual to come across a beaver crushed by a tree it had just felled—no great argument for its powers of reasoning.

Beavers mate for life. Their breeding season is January and February. After a gestation of 65-128 days, two to eight kits are born between April and June. At birth the kits are furry; their eyes are open and they are well developed. They stay with their parents for two years before striking out on their own.

While they are in the water or their lodge, beavers are not alluring prey. On land, though, great interest in beavers is taken by wolverines, lynxes, coyotes, wolves, bobcats, pumas, bears—and of course, humans. People have long prized beaver meat and fur. The Hudson Bay Trading Company sold nearly 3,000,000 beaver pelts over a 20-year period in the 19th century. Moreover, one of the beaver's glandular secretions, castoreum, was valued for centuries as a cure-all—it contains salicylic acid, just as aspirin does.

People have begun to realize, though, that beavers play a very im-

The otter's streamlined figure and lively nature make it a fine acrobat both in and out of the water.

portant part in the conservation of water and the regulation of its flow, holding back water during floods, increasing the flow during droughts, and distributing it through the soil. Where once beavers were enthusiastically exterminated, they are now being reintroduced. When alarmed, the beaver signals by slapping the water with its powerful tail. The resulting thunder-clap can be heard up to half a mile away. It seems someone has been listening.

Canadian otter

Aonyx cinerea

North America

The otter is one of the most playful of Beaver Valley's new inhabitants. It is certainly, with the exception of the polar bear, the most solitary. Sinuous and graceful, the otter's reputation as

elusive, mischievous, intelligent, and fun-loving may be anthropomorphic, but it is not totally undeserved.

The otter's body is four to five and a half feet long, including its tail. Its legs are short. Its fur is of two sorts: a silky, fawn-colored underfur, which is waterproof, and an outer layer of bristly, dark brown guard hairs. It has a whiskered, snub-nosed face with bright, liquid dark eyes. It has five toes on each foot; its hind feet are webbed, like the beaver's, and its forefeet are small and can be used to manipulate and carry. The otter lives on fish, crayfish, and fresh-water mussels, though it will also eat birds, small mammals, and frogs.

The otter is a very fast swimmer with a smooth, undulating style. It maneuvers skillfully in the water, easily performing the aquatic equivalent of



turning on a dime—all the while flicking its tail to *add* to its momentum. Otters look like sea serpents when they swim on the surface, with only their head, humped back, and tail tip curving above the water line. (In fact, the “monsters” of Loch Arkaig and Loch Morar in Scotland are thought to be otters or groups of otters, as is the “ogo-pogo” of Canada.) Under water the otter holds its forelegs against its flanks, and its hind legs move so rapidly they almost blur.

Otters mate in the water at any time of year, though spring is the peak breeding season. After 61 days, two or three cubs are born, blind and toothless but covered with silky hair. They stay in their nest for eight weeks, and with their mother until she mates again. Like baby birds, otter pups must be pushed into their first experiences outside the nest. Once in the water however, they swim as naturally and gracefully as their parents do.

Otters are nomads, seldom staying long in one place. They travel over land with much the same bounding motion they use in water and have been known to travel 16 miles overland in one night. Their favorite trick when confronted with a downhill slope is one most people have heard about: they take a couple of bounds and then slide on their bellies down the slope. On a steep, muddy, or snowy hill, this motion looks like tobogganning, and the otter can slide 40 to 50 feet.

Bush dog *Speothos venaticus* **South America**

Distantly related to the domestic dog, the bush dog actually looks like



Although bush dogs have roamed South America for a million years, their habits

a cross between a heavy dachshund and a red fox. It stands up to 15 inches at the shoulder; its coat is long and reddish-brown, and its tail is brush-like. Both tail and muzzle are short.

Little is known about this elusive animal. It is believed to be a very old species. Bush dog remains have been found with Pleistocene-era deposits in Brazil. The bush dog is bold and determined, and dislikes confinement. But when it is tamed, the bush dog behaves very like a domestic dog—it particularly enjoys the game of “fetch.” A skillful and enthusiastic swimmer and diver, the bush dog will not only fetch a stick tossed into water for it; it will also retrieve stones tossed into ponds!

The bush dog roams woodlands and grassy plains. It probably eats the usual canine diet of flesh and fruit. It hunts

in the wild remain mysterious.

in packs, like the wolf, and can be very savage.

The bush dog’s voice is remarkable. It produces a range of clicking, whistling, and chirping noises, as well as piercing squeals and cries; its barks can resemble bird calls.

The National Zoo has had bush dogs under study at its Conservation and Research Center at Front Royal, Virginia, for about three and a half years. Still, virtually nothing is known of the bush dog’s breeding habits in the wild—they are hypothesized to be typically canine. One of the Zoo’s females recently had her second litter; there were six puppies, four of which survived. Average litters in captivity appear to produce four to five pups.

Timber wolf
Canis lupus
Northern Hemisphere

(A) UNWANTED: Timber wolf, a.k.a. grey wolf. Public enemy number one since end of last Ice Age. Body 42-54 inches long, plus 11½-to 22-inch tail. Height at shoulders up to 38 inches. Weight 60-150 pounds. Ruthless and ferocious carnivore. Symbol of savagery and courage. Reputation of complete evil (viz., werewolves). Character references: Little Red Riding Hood; The Three Little Pigs; Peter (and the—); Lon Chaney.



(B) WANTED: Timber wolf (see above physical description). Known to be loving and affectionate family member. Thought to be direct ancestor of domestic dog. When raised in captivity, usually as tame and docile as domestic dog. Despite persecution, thought to be in awe of human beings. Plays important role in natural selection. Character references: Romulus, Remus, Beowulf, Apollo Lykaos, Mowgli, "wolf-boy" of Lucknow, India, "wolf-girl" of Rangipur, India, "the wild child" of France, etc.

Which description of the wolf is more accurate? Both are accurate!

The timber wolf has had by far the worst public relations of any animal that has ever interacted with *homo sapiens*—and for most of the last 10,000 or so years, with fairly good cause.

When humans were primarily nomadic hunters, living from kill to



Wolfish; lupine; wolf whistle; wolf pack; wolf down your food; keep the wolf from the door; wolf in sheep's clothing;

"Werewolves of London." It's a dog's life for the wolf!

kill—as the wolf does—they lived in reasonable amity with wolves, even taming a few to live in partnership with them and become the ancestors of “man’s best friend.” It was only with the advent of agriculture and the development of domestic livestock that the ancestor of “man’s best friend” suddenly became public enemy number one.

Wolves prefer as their prey the (relatively) defenseless—the old, the disabled, the sick, the young. Thus, wolves play a very important role in the natural selection of wild animals. But the whole point in breeding domestic livestock is to breed *out* the very qualities that nature breeds *for*: aggressiveness, speed, unfriendliness, etc. A cow, for example, is much easier prey than a buffalo; a pig is easier prey than a wild boar. The wolf’s bad reputation undoubtedly began with humans’ violent objections to having their livestock killed. Because the wolf is intelligent, cunning, and swift, no trap or wile humans have thought of has been able to stop it. The wolf is an endangered species today only because human encroachment is steadily depriving it of its habitat.

The wolf is undoubtedly both savage and courageous. Packs of wolves—both male and female—working together can bring down an animal many times the wolf’s size, such as a moose or an elk. The wolf is highly intelligent and has great powers of endurance. A wolf can run at 22 to 24 miles per hour for hours at a time—all night, if necessary.

Male seals stake out a piece of beach every spring and defend it against all comers. Keepers theorize that this male’s acrobatics are a warning type of behavior.

On the other hand, wolves mate for life, and run in family packs of three to 24 individuals. They have been proven to be very affectionate (at least, within the family). Wolves breed between January and March, and an average of seven cubs is born after a gestation period of 60 to 63 days. The cubs’ eyes open five to nine days after birth. Females are mature at two years of age, and males at three. Both parents teach the young how to hunt. Like other dogs, wolves will eat virtually anything, though their diet in the wild is primarily mice, rabbits, and squirrels.

Because of the traditional enmity between humans and wolves, the wolf’s numbers are diminishing rapidly. The enmity should be dropped—wolves attack people only when rabid or on the brink of starvation, and domestic livestock only when food in the wild runs short.

In fact, of the two, *homo sapiens* is by far the more ruthless, savage, and bloodthirsty predator. The wolf is just a hard-working canine trying to make its way in a hostile and rapidly shrinking world.

Grey seal

Halichoerus gryphus

North Atlantic and Arctic

Three-fourths of the world’s grey seals are found on the shores of Great Britain, where they rank as the largest British wild mammal. Adult male grey seals are up to nine and a half feet long and weigh up to 600 pounds; adult females are smaller, reaching only seven feet in length and 550 pounds in weight.

Grey seals come in many colors between black and silver, depending on their age, sex, and state of moult. Seal pups are born covered with white hair. Three weeks later, the “white-





Swift and graceful in the water, the grey seal propels itself on land with an

ungainly hunching motion.

coat" is shed, to be replaced by the "bluecoat" prized by furriers. This adult coat is moulted annually shortly before the breeding season starts.

The males' dark fur is marked with irregular blotches of a paler grey than the background color; on females, the markings are dark grey spots against a silvery background. Thus the sex of a grey seal is often easily determined—provided the difference between background and blotch is clear!

Grey seals breed at any time of year. The peak seasons are September to December in Britain and spring in the western part of the Atlantic. Adult males and females come together then on breeding islands, with the older seal

bulls forcing the younger bulls away from the territories they have staked out for themselves. The pups are born quickly and weigh 30 pounds at birth. They convert their mother's rich milk to blubber at an amazing rate: after three weeks, they weigh 90 pounds. At this time they are weaned and abandoned. They may starve before they learn to feed if they have not accumulated enough blubber.

A favorite for sealskin coats, oil for lamps, and food (once a luxury item, seal meat is now largely used for dog food), and in great disfavor because of its predilection for stealing salmon straight from fishing nets, the grey seal at the turn of the 20th century was near extinction. The 1914 and 1932 Grey Seal Protection Acts in Britain

saved them, and grey seal populations today are healthy in number.

The Scottish legend of the Silkie—the woman who has been transformed into a seal, or possibly the seal-woman—probably arose from the seals' habit of abandoning their pups on weaning. Silies were supposed to be like Sirens, their pathetic cries luring human men to their doom. But the Silies' haunting calls were probably in reality those of hungry grey seal pups, answered by the howls of their mothers, both echoing eerily off the rocks and cliffs of their lonely breeding beach.

California sea lion

Zalophus californianus

Coastal California and Mexico, the Galapagos Islands, the islands off Japan

Seals and sea lions are often confused. For one thing, all species of sea lions resemble one species of seal, the fur seal. For another, California sea lions, easily tamed and easily trained, are favorites in circuses—and are called "performing seals," thus adding to the confusion.

California sea lions are expert swimmers and fishers. The smallest of the sea lion species, they reach lengths of only six feet (female) to seven feet (male), and weights of only 400-500 pounds. When wet, their fur seems almost black; dry, it is a deep chocolate brown. The males do not have the mane-like ruff around their necks and shoulders that the males of other sea lion species do.

California sea lions are not popular with commercial fisheries, which tend to blame them for damages to fish and

equipment alike. Unlike grey seals, California sea lions prefer squid to salmon—but, like the seals, they'll eat almost anything they can get so long as it is fish.

Extraordinarily graceful in water, the California sea lion is naturally playful, and has been seen chasing its own air bubbles as they rise. On land it moves by bounding on its flippers. On smooth ground it can move faster than a person can walk. Any falls are absorbed by the front flippers and by ribs made from cartilage instead of bone.

Like grey seals, the California sea lion comes ashore once a year at breeding time. The old bulls come first, staking out their own beaches and driving young bulls away. Two to three weeks later, when the dust has settled, the already-pregnant cows follow the bulls, and settle into harems of 10 to 20 cows per bull.

A day later, the pups are born; they are suckled for up to a year. A few days after the pups are born, the cows mate with the bulls on whose beaches they gave birth; they then return to the sea to feed. The pups learn to swim early. Female sea lions are mature between three and four years of age, and mate immediately; the males are mature between four and five, but may not mate until they are large enough, strong enough, and fierce enough to stake out their own beach territories—usually when they are seven to nine years old.

Keeper leader Kayce Cover greets two of her pinniped charges. "Sea lions are more complex animals than people think," she says.

Gregarious, inquisitive, and intelligent, California sea lions are quite tame even in the wild. Except when defending their territory or their pups, they will allow humans to come close.

The sea lion's most famous circus trick is balancing a ball on its nose—

and it does *not* know how to do this instinctively; it must be taught. As the keepers at Beaver Valley will attest, sea lions learn quickly and eagerly... and when they have learned a task well, they are almost as pleased about it as their trainers are. □



BOOK NEWS

Richard Perry, *Bears*
(NY: Arco Publishing Company),
1970

Bears is a book of general knowledge that presents a large amount of information in a non-technical manner. Frequent excerpts from the journals of nineteenth-century explorers enhance the book's easy-reading approach.

The author covers all the various types of bears, what they have in common and where they differ, along with all the general and important aspects of their lives: habitat, diet, reproduction, and interactions with humans. The chapters "In Winter Dens" and "Anti-Social and Family Life" are of special value, as are the fascinating and occasionally humorous facts scattered through the beautifully illustrated text.

Ogden Tanner, *Beavers and Other Pond Dwellers*
(NY: Time-Life), 1977

Beavers and Other Pond Dwellers is worth reading if for no other reason than the tremendous amount of enthusiasm it generates in the reader. The book deals not only with beavers, but also with the animals that live in

and near the beavers' pond environment. It illustrates the entire ecosystem of the pond—described as "a simmering animal-vegetable soup"—in a way that makes it easy for the reader to extend it to the world in general.

The text is precisely written and accompanied by numerous excellent photographs; it is especially useful for young adults in its well-organized presentation of the interrelationships of various pond animals.

The section on beavers has a particularly charming text; the chapter on raccoons should be of particular interest to Washington-area residents. "Amphibians and Reptiles" has a wonderful section on frogs.

One of the most valuable lessons a zoo can teach is the interdependence and interrelationships of all living things; this book teaches it well.

Gavin Maxwell, *Seals of the World*
(Boston: Houghton Mifflin Co.),
1967

An excellent introduction to seals, although some of the reading may be rather difficult; quite a lot of specific zoological terminology is used. The first two chapters are especially helpful. There is a tendency to refer to seals and sea lions collectively as "seals"; chapter one, "What Makes a Seal," makes clear the difference. Chapter two deals with the seal in relation to human beings, giving a clear view of their present status and somewhat shaky future.

This is a fine compilation of factual information and a revealing documentation of the plight of one of our most beautiful and intelligent mammalian relatives.

—Frances Chiles

Barry Holstun Lopez, *Of Wolves and Men*
(NY: Charles Scribner's Sons,), 1978

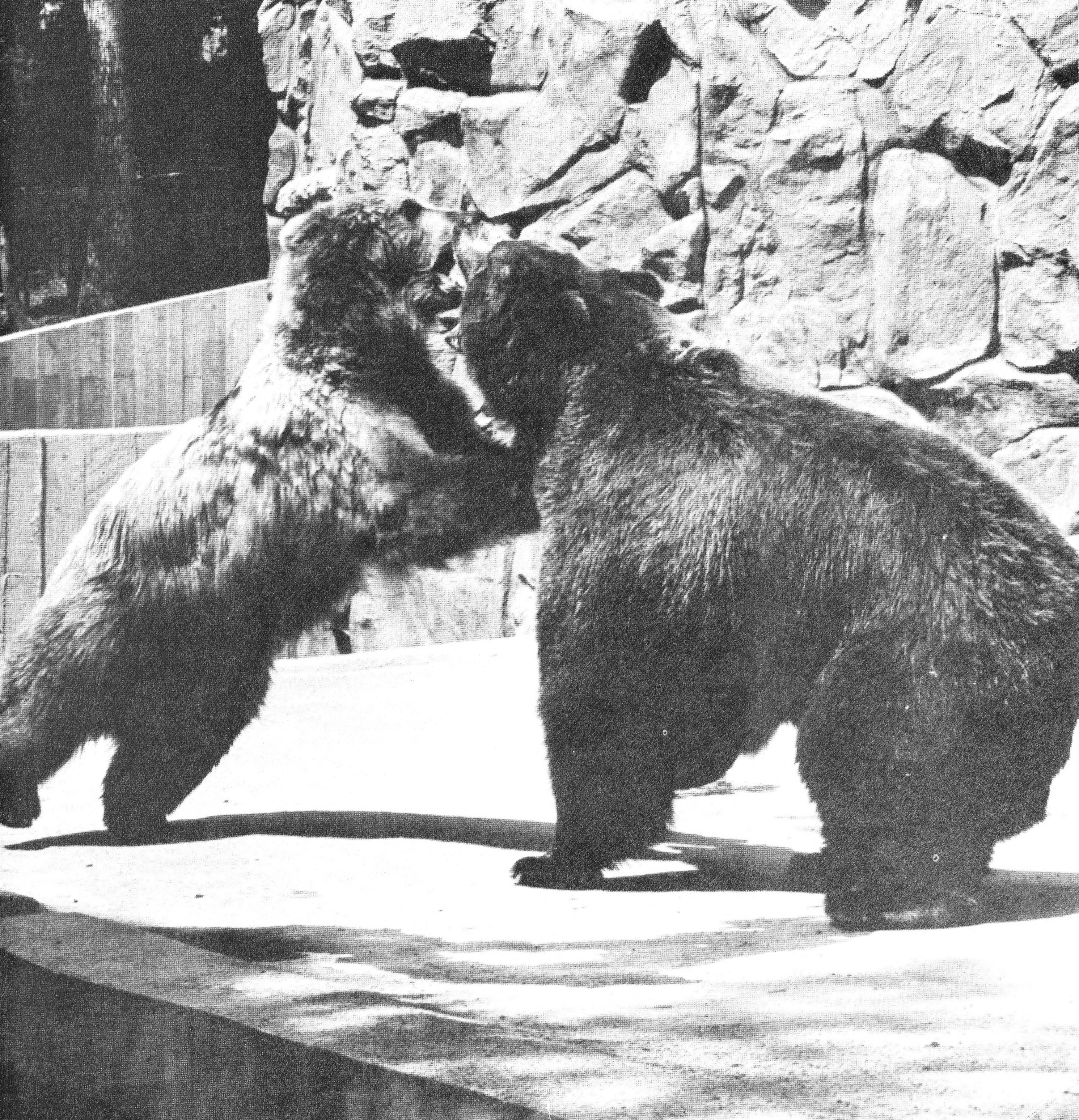
"Wolf": the very word connotes a powerful blend of images—hunter, hunted, mystery, legend. *Of Wolves and Men* combines the author's field studies with documentation by scientists, explorers, Indians, and Eskimos. Superb design, striking photographs, folk drawings, poems, and selected quotations from primary sources amplify and reinforce Lopez's well-researched and gracefully written text.

Though Lopez definitely has his point to make about wolf conservation, he must be credited with presenting a balanced view of this emotionally charged issue. It is as if he has decided simply to give the reader a full appreciation of what "wolf" means—in its contemporary, historical, scientific, and anthropological senses—and to let the quiet eloquence of this valuable book make its own poignant plea for understanding and preserving this fascinating animal.

—Emily Rudin

Like dogs, young bears playing together engage in mock fights. Adult male bears in the wild live half as long as females do, possibly because of territorial battles with other males.

BACK COVER: The sea lions' underwater viewing window is fascinating both to people and pinnipeds.





**Friends
of the
National**



at the National Zoological Park
Washington, D.C. 20008

Non-Profit Org.
U.S. Postage

PAID

Washington, D.C.
Permit No. 44282

Address correction requested